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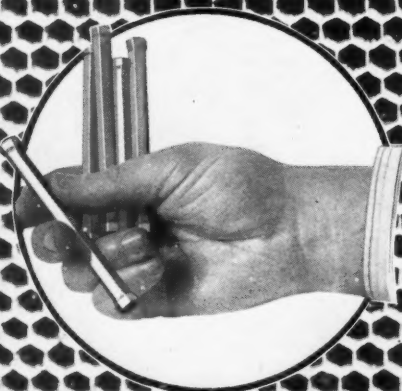
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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Number 20

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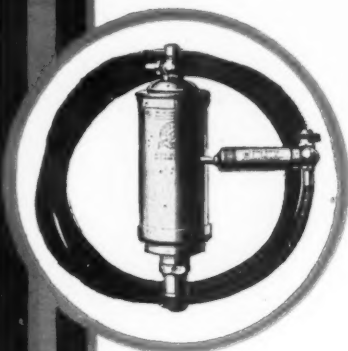
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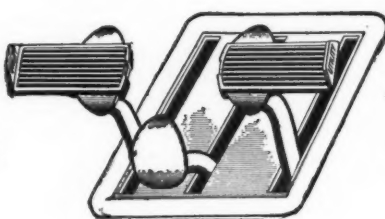
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XL

NEW YORK—THURSDAY, MAY 15, 1919—CHICAGO

No. 20

FRENCH TRACTOR DESIGN Shows Lack of Uniformity

Spring Agricultural Exhibition at Saint-Germain Brings Out Varied Array of
Machines of Four-Wheel, Track-Laying and Cable Type—Tractor
Industry Getting Into Hands of Automobile Makers

By W. F. Bradley

PARIS, April 12—France held her big spring agricultural tractor exhibition last week on a farm at Saint-Germain, 12 miles west of Paris. Unlike tractor demonstrations in America, it was not a competitive event, the machines merely demonstrating individually what they could do. Because of this the results were not entirely satisfactory. Not enough information of practical value to tractor users was developed.

Several things of interest to those familiar with tractor conditions in America, as showing in contrast tractor conditions in France, were emphasized by the meeting. Among them was the fact that the French automobile industry is actively taking hold of the tractor and appears likely to retain control of its manufacture in that coun-

try and that French machines are much more expensive than those made in America, ranging in price from \$2,500 to \$7,000 each. Another point of interest to which attention was again called by this meeting is the fact that few tractors are sold to individual farmers in France but rather to groups or co-operations of not less than seven men. Any such group can obtain from the French Ministry of Agriculture a subsidy varying from 30 to 50 per cent of the cost price of the machine. Purchasers under this system have to give a guarantee that the machine will be kept in repair and that a determined amount of land will be cultivated.

There were 34 firms present at the exhibition, some of them with two or three models of the same type. Seventeen of these firms were French, one English and sixteen



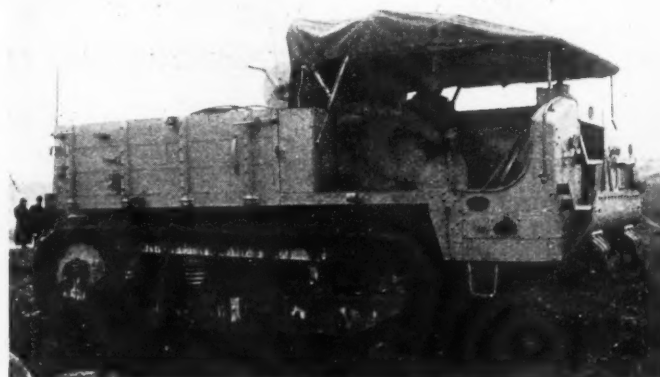
A demonstration of the Renault tractor at Saint-Germain



The new Delahaye is a three-wheel, self-contained plowing machine driven by a four-cylinder engine. Two of the driving wheels are in tandem on the side not shown



The English Austin is a frank copy of the Fordson



The Schneider tractor is a development from the French tank

American. The American tractors were difficult to recognize from their catalog descriptions, for in most cases the French importers have re-christened them since taking them over. Frequently what at first sight would appear to be a French production turned out on closer examination to be a well-known American tractor. The leading American makes represented were Fordson, Bull, Cleveland, Heider, Case, Gray, Neverslip, Happy Farmer, Moline, Titan, Avery, Parrett.

Before the demonstration had been brought to a close it was realized that it should have been of a competitive nature in order to provide definite and practical information to possible purchasers. Information on price and delivery dates was obtainable, but on all other points connected with the machines, vague, contradictory and frequently foolish answers were given. Many of the makers could not answer elementary questions on gas consumption, drawbar pull, speed of operation on various land and under varied conditions, depreciation, possible cost of repairs, etc. A practical test would have given some sound basis on which to make comparisons and would have been of great value to those who are contemplating purchase.

This demonstration revealed that automobile manu-

facturers are interesting themselves in agricultural tractors, for all the new machines came from firms which before the war built trucks and touring cars only. The three most important new arrivals were Renault, Delahaye and Gnome & Rhone. Other big firms were De Dion Bouton, Latil, Schneider, Peugeot and the Paris General Omnibus Company. The Gnome & Rhone Company is the well-known aviation engine firm, which possesses in the suburbs of Paris a couple of the most modern factories to be found in Europe.

There is no uniformity in the minds of European manufacturers regarding the best type of agricultural tractor. They are all using four-cylinder vertical truck type engines, and they are all putting as good work in their tractors as in the best trucks, but beyond this the greatest diversity exists.

Fiat, who is representative of Italy, and Austin, who is representative of England, have adopted the four-wheel frameless type of tractor. Renault, the biggest automobile manufacturer in France, has adopted the self-track-laying type. Delahaye, one of the biggest truck makers in France, has built a self-contained plowing machine, with plows placed in front and in rear. Latil, the most important four-wheel-drive tractor maker, has

a self-contained machine with plow in the rear. De Dion-Bouton has adopted the cable system of plowing with fixed tractors. The big Schneider company has both an endless track type and a rotary plow. The Paris General Omnibus Company has adopted the English Saunderson type of direct towing tractor. Filtz has a special type of cable machine, the ends of the cable being fixed, and the machine hauling itself along by means of winding drums.

The Cable Type

In the cable class alone there are three distinct methods, and both gasoline and electricity are employed as the motive power. In the first class is the De Dion-Bouton type, where the two machines take up a position at the extremities of the field and haul the plow across the land by means of a cable and winding drums. In the Doisy system the tractor runs across the field, unwinding its cable as it goes, then anchors itself and hauls the plow by means of its winding drum. Finally the Filtz type has the ends of the cable fixed at each extremity of the ground and hauls itself along by means of winding drums, with the plow in direct tow.

All the leading European makers, Fiat, Renault, Delahaye, De Dion-Bouton, Latil, Schneider, use their truck

engines with enclosed valves on one side, high-tension ignition, forced feed lubrication and automatic carbureters for gasoline or benzol. Air cleaners are not used by anybody, for the climate of France and England is so damp that a tractor aspires less dust than a truck on the road. Nobody has made any provision for night plowing, for this does not appear to have entered into the habits of the French farmer.

European machines are costly. The Delahaye is listed at \$7,000, calculating at the nominal rate of 5 francs to the dollar. This price, of course, includes the plows, as the machine is self-contained. The Renault creeper type of tractor is sold for \$5,700; the Fiat runs about this price and the Latil is a little higher. Some of the cheapest direct tractors are selling at \$2,400 to \$2,500.

The Renault, a Converted Tank

Since Nov. 11 Renault has transformed his army tank shops into a tractor producing plant, and at the present moment is turning out 100 agricultural tractors a month. The assembly of these tractors is carried out in a very modern method on a moving rail. The Renault tractor is the direct outcome of the two-man tank built in large quantities during the war. The engine is exactly the same, being a four-cylinder block type of 95 by 160 mm.



An American representative—the Moline—at Saint-Germain



The new Renault incorporates the general features of the small tank



The Tourand-Latil tractor approaches the automobile type in general design, but the plows are permanently attached



The Filtz tractor is a variation of the cable type. The cable is anchored at each end and the tractor pulls itself along by means of it

bore and stroke. The gasoline feed adopted on the tank to assure a flow of gas to the carburetor whatever the inclination of the machine has given place to direct flow by gravity. The special lubricating system, however, with dry base chamber, has been retained.

Engine Mounted at Front

Instead of the engine being at the rear, as on the tank, it is mounted at the front, under a hood, with the radiator behind it, inclined at an angle of about 45 deg. This radiator is of the gilled tube type, with a ribbed aluminum header tank, and has a draft of air drawn through it by means of the flywheel fan. In this way no air is drawn in over the engine.

From the engine the power is transmitted through an inverted leather faced cone clutch to a four-speed gearbox, then by a couple of Ferodo lined lateral clutches and a train of reducing gears to the two driving sprockets, one on each side, which transmit the movement to the endless bands. As in the case of the tank, the tension of the endless band is maintained automatically. Indeed, the whole of the track-laying mechanism is the same in general design as on the tank. Naturally, the parts are smaller and lighter, the bands, for instance, having a face width of 7 in. as compared with 13½ in. for the tank.

Steering is by means of a couple of levers mounted on a vertical column. By pulling the right-hand lever the lateral clutch on that side is withdrawn and the entire tractor made to turn to the right. The power plant is mounted in a channel section frame which is attached at the rear to the endless track mechanism and secured at the front by an inverted semi-elliptic spring.

Renault Tractor Dimensions

Overall dimensions of the Renault tractor are 135 by 69 in. The endless tracks have a length of 64 in. in contact with the ground; total weight of the machine is 6000 lb., and drawbar pull 5500 lb. The catalog price of the tractor is 28,000 francs, or \$5,600 at nominal rate of exchange.

The new Delahaye is a complicated, well-built, three-wheel, self-contained plowing machine. The four-cylinder engine is the 4-ton truck type of 100 by 160

mm. (3.9 by 6.29 in.) bore and stroke, placed across the machine. Two of the driving wheels are in tandem on the outside, and the third wheel, which is also a driver, is centered between the two others. Mounted transversely in the frame, with the radiator placed just back of the single wheel, is the four-cylinder engine, clutch and gearset, this latter providing two speeds ahead or reverse. The drive is taken to the wheels in tandem by means of a couple of horizontal shafts, one running ahead and the other astern, to worm gearing, and finally by enclosed internal spur gears. The single wheel receives its drive more direct by means

of a transverse shaft parallel with the crankshaft and enclosed internal gear.

The two wheels in tandem are steerers as well as drivers, but the turning angle is very small, and does not



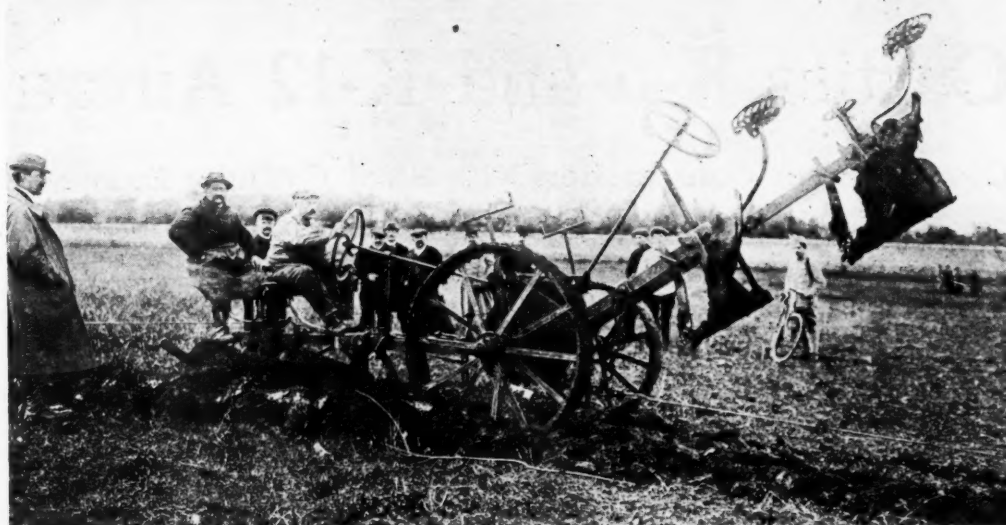
A three-wheel machine with rotary plow built by the Schneider company



One of the 16 American makes represented—the Case

appear to give anything more than is necessary to change position for a fresh furrow when the end of the ground is reached. The operator sits on the outside of the machine, in the position farthest removed from the furrow, and has a couple of steering wheels mounted on the top of a vertical column. The steering is naturally duplicated, there being two main steering arms and two fore and aft connecting rods. As the steering pivots are on the inside of the wheels and the fore and aft rods are on the outside, connection is made by carrying the connection through the wheel hub. On the opposite side a similar method is adopted when the starting crank is carried through the hub of the single driving wheel.

A four-bottom plow is mounted at each end of the machine, and each one can be raised mechanically by



The only electrically pulled cable plow exhibited at Saint-Germain. Electric winches at either end of the plot to be plowed pull the plow first one way and then the other



The Delahaye is a four-furrow machine with plows on each end



Valve and manifold side of the four-cylinder engine fitted to the Tourand-Latil tractor

means of a winch. The single driving wheel has a diameter of 60 in. and a face width of 11.8 in. The two wheels in tandem have a width of 51 in. Total weight of the machine with plows is 8800 lb.

De Dion-Bouton produces two types of cable plowing machines. One of these is rated at 50 hp. and has a four-cylinder engine of 4.8 by 5.9 in. bore and stroke; the smaller one, rated at 30 hp., has a four-cylinder engine of 3.9 by 5.5 in. bore and stroke. The method of operating is to place a tractor-winch at each end of the machine and to haul a double plow across the land. Each tractor has its engine in front, winding drum in the center, and a small platform at the rear. The big tractor takes the drive to the rear wheels by means of transverse shafts and internal gears, exactly the same as on De Dion-Bouton trucks, but the number of gears is reduced to two and reverse.

A 15-mm. steel cable is used, having a length of 550 yd., with a breaking strain at 26,000 lb. The drawbar pull is 7000 lb. average, this allowing plowing to be carried out, in moderate ground, with a six-blade plow to a depth of 9.8 in., giving a width of 70 in., at a speed of 2.3 to 2.8 miles an hour. With three blades, and plowing to a depth of 11.4 in., the width of land operated on is 47 in. Gasoline consumption is said to be 3 to 3¼ gal. per acre with a drawbar pull of 7000 lb., using a six-blade plow and plowing to a depth of 7 to 9½ in. Under these conditions two of the big machines working together will cover 12 acres per day of 10 hours.

The smaller De Dion-Bouton machine differs from the larger by reason of the adoption of chain drive, with only a single gear ahead and one reverse. The winding drum is provided with 440 yd. of 13-mm. steel cable, having a rupture point at 20,000 lb. The drawbar pull is 4400 lb., and the plowing speed 2.3 to 2.7 miles an hour.

The Gnome and Rhone

The new tractor for which the Gnome & Rhone Company is responsible, or rather will be responsible, for the exhibition model appears to be an experimental type built outside, is a four-wheel driver type. At the trials a machine was shown with a twin cylinder vertical engine, but it was explained that this will be replaced by a four-cylinder vertical slow-speed engine of 16-20 hp., water cooled, with forced feed lubrication. The tractor, which is of comparatively light weight, namely 2800 lb.,

(Continued on page 1085)

Curtiss K-6 and K-12 Aircraft Engines

Of Aluminum Construction with Steel Cylinder Liners—Outstanding Features Include Counterbalanced Crankshaft, Double Valves in Heads; Overhead Camshafts and Bevel Gear Camshaft Drives—Herringbone Gear Reduction on the K-12

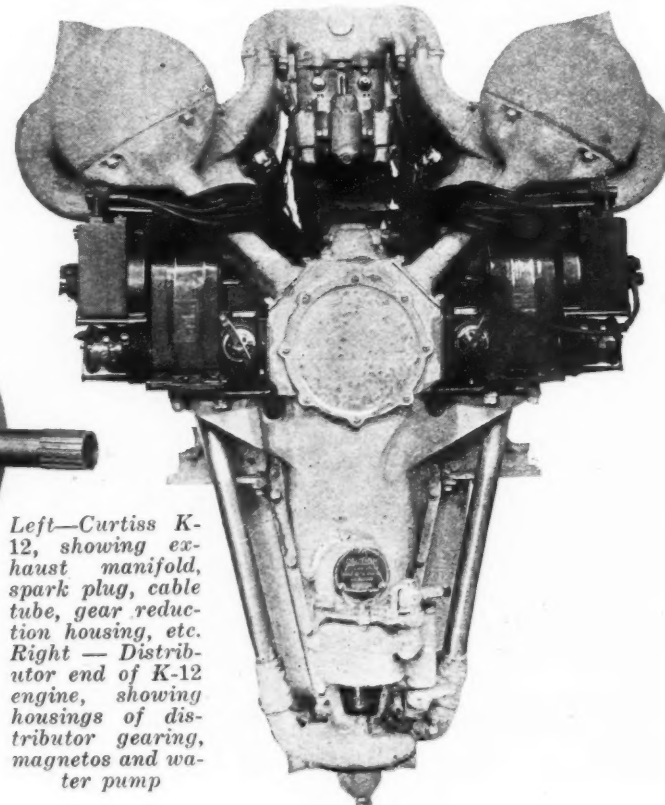
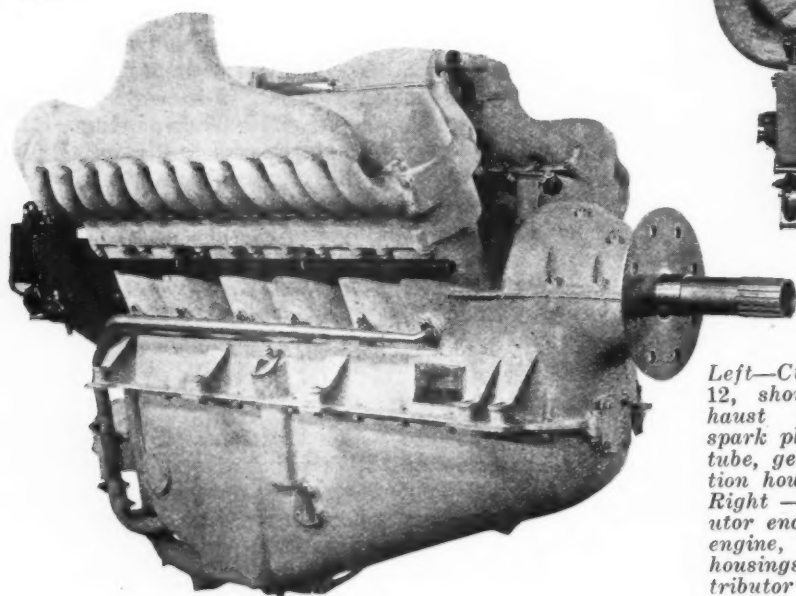
DURING the latter part of the war the Curtiss Aeroplane & Motor Corp., Garden City, L. I., and Buffalo, N. Y., developed two high-powered airplane engines of which it has been possible to obtain complete technical details only quite recently. One is a 6-cylinder and the other is 12-cylinder type, as indicated by the designations K-6 and K-12. Both have cylinders of the same dimensions and are identical in design except for the greater cylinder number and output of the twelve and for the fact that the latter is a V-type engine while the K-6 is a vertical type. The general construction may be briefly described as follows: Cylinder blocks and top half of crankcase are in one casting of aluminum. The cylinder heads form a separate aluminum casting which is bolted to the cylinder block. Steel cylinders or liners are used, six of them being screwed into each cylinder head. The cylinder heads are then placed over the cylinder blocks, and watertight joints between the steel liners and the aluminum blocks secured by means of packing.

In the K-6 the cylinders are, of course, set all in line, while in the K-12 they are set at an angle of 60 deg. This is the natural angle for a 12-cylinder engine, as it gives uniformly spaced explosions, though the practice often has been departed from in aircraft engine design in order to decrease the head-on air resistance. The bore is $4\frac{1}{2}$ in. and the stroke 6 in., which gives a piston displacement of 572.4 cu. in. for the K-6 and 1144.8 cu. in. for the K-12. A power curve of the K-12 has been published which shows an output of 420 hp. at 1600 r.p.m.

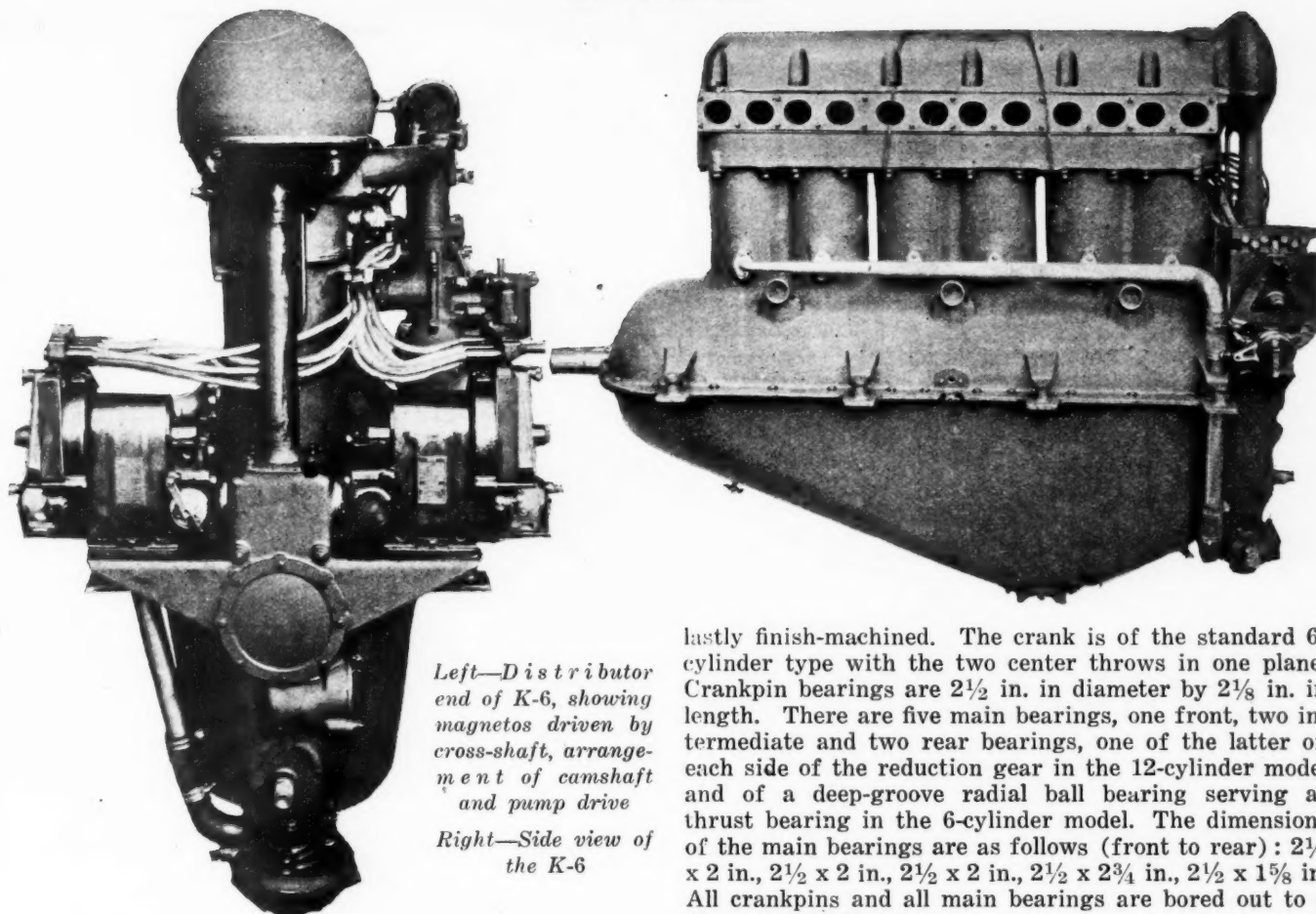
The K-6, which is a direct driving engine, weighs 420 lb. dry, with all equipment except the exhaust manifold (14 lb.). This is 0.735 lb. per cu. in. displacement, and slightly over 2 lb. per hp. The K-12, which is a geared engine, weighs 720 lb. dry, with all equipment except the two exhaust manifolds (28 lb.). This is 0.63 lb. per cu. in. displacement and well below 2 lb. per hp.

The cylinder liners are made of hydraulic forgings of high-carbon steel, which are first rough bored and rough turned, and then subjected to heat treatment. The liner is then reamed out to within a few thousandths in. of its finished size, and the outside is finish-turned to a wall thickness of $\frac{5}{64}$ in., leaving stiffening flanges every 1 in. of length, as well as a packing retaining flange at the bottom and a central stud at the top. The upper end of the liner, forming the combustion chamber, is slightly enlarged and is turned with a screw thread on its outside by means of which it is screwed into the cylinder head. The liners are of thimble form, having a closed head, in which there are four openings for the four valves respectively.

The cylinder head is an aluminum casting, in which are formed the inlet and exhaust valve passages, the combustion chamber recess and the necessary water spaces.



Left—Curtiss K-12, showing exhaust manifold, spark plug, cable tube, gear reduction housing, etc. Right — Distributor end of K-12 engine, showing housings of distributor gearing, magnetos and water pump



Left—Distributor end of K-6, showing magnetos driven by cross-shaft, arrangement of camshaft and pump drive

Right—Side view of the K-6

The combustion chamber recesses are internally threaded and the six cylinder liners are screwed into the cylinder head, the head casting and the six liners together forming a complete unit. The head casting extends somewhat beyond the section of the cylinders, matching up with a flange cast on the upper end of the cylinder block, and is held in place on the cylinder by means of studs, screwed into the cylinder head, passing through the flange on the cylinder block, and having nuts on their lower end.

In order to insure intimate contact of the head portion of the steel liner and the head casting, the liner is formed with a threaded stud at the center of its head which passes through the combustion chamber wall in the cylinder head casting, and is drawn up by a nut. The threaded portion of the liners is made a tight fit in the threaded portion of the cylinder head, and this is depended on to give good heat conduction.

Liners Assembled with Cylinder Head

When the six liners have been assembled with the head, the assemblies are finished on all surfaces which have to be very accurate. The upper and lower faces are machined to absolute parallelism, the cylinder liner bores are ground to size, the valve ports bored and seated, and the spark plug bushings inserted. These bushings, which are of bronze, are cut with a tapered thread on the outside, and with an 18 mm. standard spark plug thread on the inside. When these bushings are screwed tightly into the cylinder heads, there is said to be no danger of their coming loose while unscrewing the spark plug.

The same size of crankshaft is used in both engines, although the K-12 develops about 100 per cent greater power. The crankshafts are made of 35-45 point carbon, chrome nickel steel, by the drop forging process. The forgings are first rough-machined, then heat-treated and

lastly finish-machined. The crank is of the standard 6-cylinder type with the two center throws in one plane. Crankpin bearings are $2\frac{1}{2}$ in. in diameter by $2\frac{1}{8}$ in. in length. There are five main bearings, one front, two intermediate and two rear bearings, one of the latter on each side of the reduction gear in the 12-cylinder model and of a deep-groove radial ball bearing serving as thrust bearing in the 6-cylinder model. The dimensions of the main bearings are as follows (front to rear): $2\frac{1}{2} \times 2$ in., $2\frac{1}{2} \times 2$ in., $2\frac{1}{2} \times 2$ in., $2\frac{1}{2} \times 2\frac{3}{4}$ in., $2\frac{1}{2} \times 1\frac{5}{8}$ in. All crankpins and all main bearings are bored out to a diameter of $1\frac{7}{8}$ in.

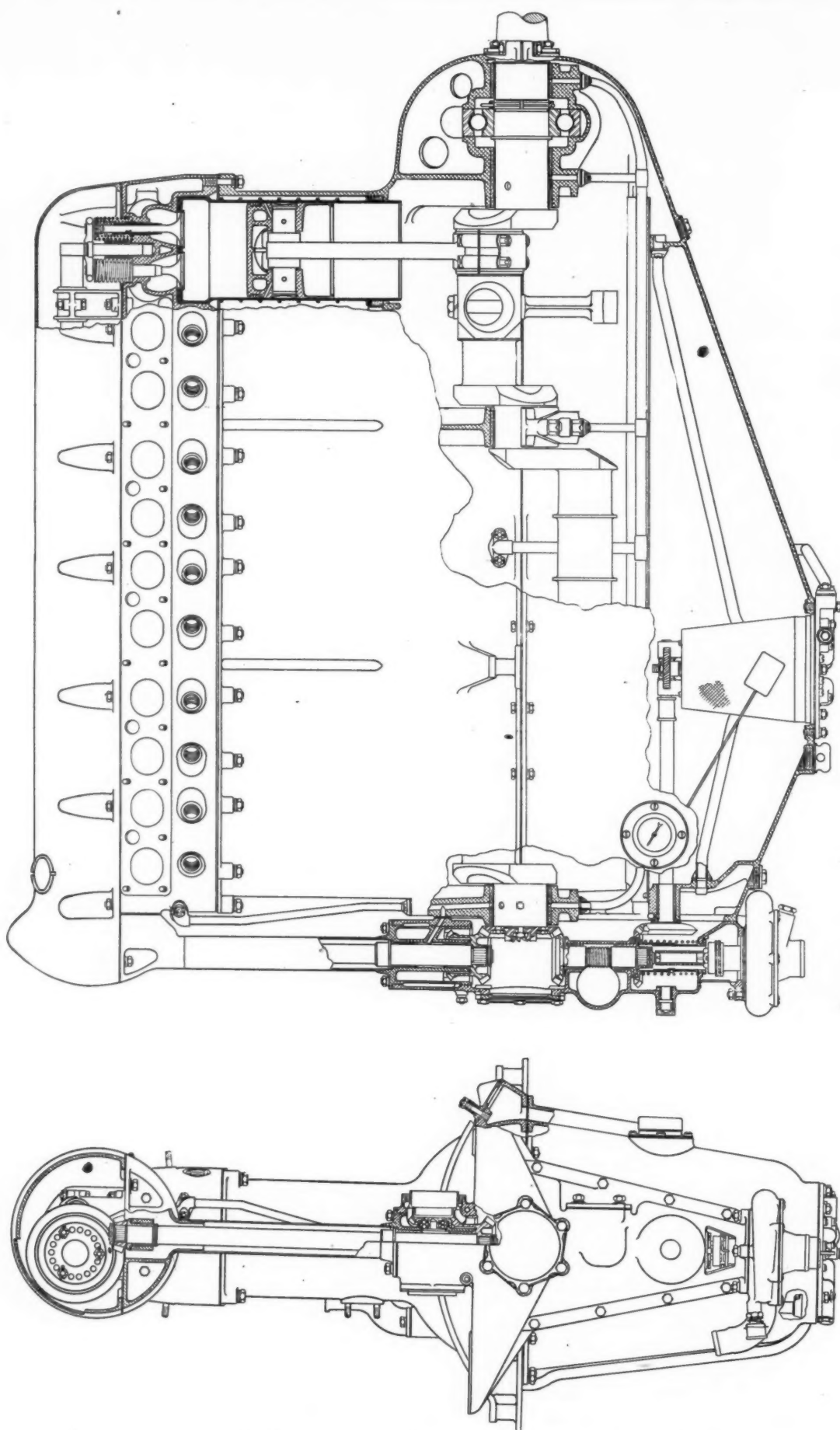
Crankshaft Carries Balance Weights

The problem of crankshaft balance has been thoroughly considered, and on the two long arms of the crank there are balance weights to insure perfect running balance. These two long crankarms naturally produce an unbalanced moment around the crank axis, which in the conventional 6-cylinder crankshaft is balanced by a spool between the two center crankpins. However, this balancing weight between the two center pins is a source of weakness, owing to the bending moment produced by the centrifugal force on it at high speed. Another disadvantage of this method of balancing a 6-cylinder crankshaft is that, whereas the unbalanced moments are produced between the first and second and between the fifth and sixth crank throws respectively, it is attempted to neutralize them by a moment created by a balance weight between the third and fourth crank throws. Hence the opposing moments are in different planes, separated by one of the main bearings of the crankshaft, and this naturally imposes additional load on the bearings. By applying balance weights directly to the sides of the long crank arms their unbalanced moments are eliminated, and the double center throw of the crankshaft can be made without the balancing spool, whereby the centrifugal force on it is reduced.

To obtain the greatest possible balancing effect with the least weight, aluminum spacers are inserted between the steel balance weights and the crankshaft, the balance weights being held to the crankshaft by steel bolts.

At the forward end of the crankshaft an internal flange is machined to which the combined camshaft driving bevel gear and starting ratchet is secured by means of 6 bolts. At the rear end of the 6-cylinder crankshaft a deep groove radial type ball bearing is mounted between

Curtiss K-6 Airplane Engine



This view shows details of the camshaft and accessory drive, the crankshaft, the cylinder liners, pistons, valves and oiling system. The cylinder dimensions are $4\frac{1}{2} \times 6$ in.

a flange and a nut, to take up the end thrust of the propeller. The rear end of the 12-cylinder crankshaft is turned with an integral flange, to which is bolted the driving member of the herringbone reduction gear, by means of nine 7/16-in. alloy steel bolts. The driving gear is cut with 5-7 pitch stub teeth, the teeth of the two sections of the gear being staggered.

Crankcase Cast Integral with Cylinder Block

In both models the upper half of the crankcase is cast integral with the cylinder block, and naturally it is different in design for the two, but the lower halves are the same in both engines. The cylinder portion of the casting forms only the jacket wall, the cylinder wall proper being formed by the steel liners. At the bottom of the cylinder there is an internal flange, between which and an external flange at the bottom of the steel liner is inserted a cork packing ring to insure a water-tight joint. Between the top of the cylinder casting and the cylinder head there is a copper-asbestos gasket. There is direct communication between the water space of the cylinders and that of the cylinder heads through drilled holes. It is claimed for this construction that, with the bolted joints between the cylinder block and the crankcase eliminated, a very rigid structure is obtained, besides which the cooling water comes in direct contact with the steel cylinder liner, which insures very effective cooling.

All main bearings are supported by the upper half of the crankcase, on partition walls of same. The caps of the bearings are of very substantial design, having an I section, and are held in place by 4 studs, fitted with cast-tellated nuts and cotter pins. The studs of the rear bearings on the K-12 extend entirely through the gear housing and crankcasing, having nuts applied to them at both ends. In this way the aluminum housing is relieved of the strain due to the tooth pressure of the reduction gear. In order to prevent disalignment of bearing caps, they are formed with large keys. The cap of the reduction gear housing is designed with recesses for the nuts on the retaining bolts, and all ribs are on the inside, so that a very smooth exterior is obtained. In addition to the "through" bolts holding the rear bearings in place, several other studs are used for retaining the reduction gear housing cap.

All bearings are of the bronze-back, babbitt-lined type,

tin babbitt being used, and are held from turning in the bearings by means of brass screws with countersunk heads. No shims are used between the halves of the bearing, the two half bushings being in direct contact with each other. All journals of the crankshaft are ground accurately to size, and as the bushings are reamed in a precision fixture, there should be the same clearance on all journals of the shaft.

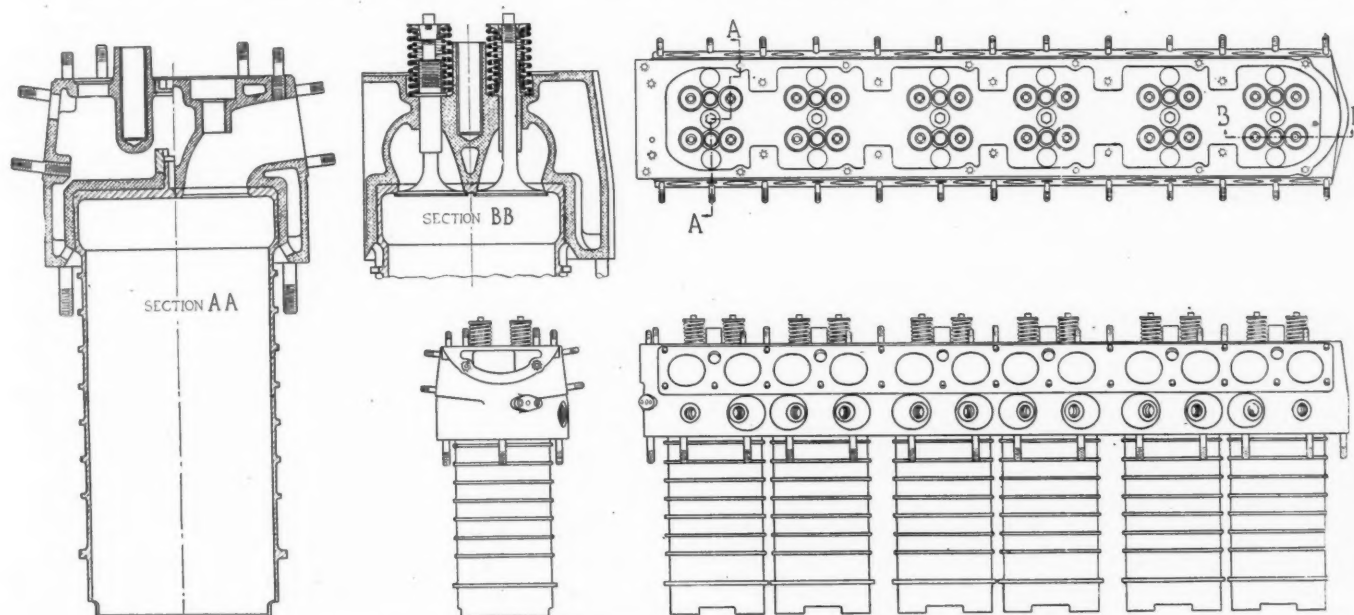
Pistons of aluminum alloy are used. With a view to quickly carrying off the heat absorbed by the cylinder head, the pistons are heavily ribbed, there being one circular rib concentric with the skirt, and, in addition, a number of radial ribs which extend the whole length of the skirt and help to transmit heat from the head to the skirt.

There are three piston rings on the piston above the pin. Of these the upper two are 1/8 in. wide each, while the lower one is 3/32 in. wide. Directly below the lower ring there is an oil groove from which inclined holes are drilled to the bearing surfaces of the piston pin in the piston bosses. The piston pin floats in both the piston and the connecting rod and is held against endwise motion by a snap ring in each piston boss.

Connecting Rods I Section

The connecting rods are I-section drop forgings of alloy steel. They are heat treated and machined all over. In the 12-cylinder model, where the pistons of oppositely located cylinders work upon the same crankpin, there is one master rod, which is provided with a lug at its big end to which the other rod of the pair is pivoted. A wristpin for the small connecting rod is secured in this lug by means of a clamp screw, and the small rod straddles the lug. Bronze bushings are used in the wristpin bearings and also in the upper ends of all connecting rods.

As already mentioned, there are two inlet and two exhaust valves in each cylinder, and the two sets are interchangeable. These valves have a clear diameter of 1 5/8 in., and the seat is 1/16 in. wide. Cast iron bushings are inserted into the valve stem guides in the cylinder head, these bushings being fitted to a slight taper. Each valve has two concentric springs of alloy spring steel. The inner spring rests against a flange on the valve guide bushing, while the outer spring rests in a recess in the head casting. The spring washers on the ends of the valve stem are backed up by nuts secured by straight



Assembly of six cylinder liners with aluminum cylinder head casting

pins, so that the pressure of the springs can be adjusted.

There are two camshafts extending across the top of the cylinder heads, the whole length of the engine. The cams do not act directly upon the valve stems, but through the intermediary of cam followers in the form of yokes, each of which embraces the tops of two valves of the same kind. These cam followers are provided with stems sliding in a bushed guide between the valves. There are adjusting screws in each arm of the cam follower yoke, by means of which the valve clearance can be adjusted. When the adjustment is made the adjusting screw is locked by means of a clamp screw.

In the 6-cylinder model, the camshaft is driven from a bevel pinion on the forward end of the crankshaft through a vertical shaft extending up the forward end of the engine. As this vertical shaft is located in the center plane of the cylinders, whereas both of the camshafts are outside this center plane, a pair of skew bevel gears has to be used at the upper end for driving one of the camshafts from this vertical shaft. The other camshaft is driven from the first one through a pair of helical gears. In the 12-cylinder model the arrangement is naturally somewhat different. Here an intermediary vertical shaft is used, which receives its motion from the crankshaft through a pair of bevel gears. This shaft extends up from the crankshaft, and near its upper end carries two bevel pinions, the lower of which meshes with two magneto driving gears and the upper with gears on the two camshaft driving shafts. This intermediate shaft is mounted in a long plain bearing at its lower end and in a ball bearing at its upper end.

Camshaft Driving Shafts Inclined 45 Deg.

What gives the Curtiss K-12 a somewhat unusual appearance is the fact that the camshaft driving shafts at the forward end of the engine do not run parallel with the axes of the cylinders, but are inclined 45 deg. to the vertical. These camshaft driving shafts are mounted in ball bearings at both ends. In the K-12 the axis of the camshaft driving shaft intersects the axis of the driven camshaft, and, therefore, straight bevel gears are used at the upper end. The gear at the lower end of the camshaft drive shaft is integral with the shaft, while that at the upper end is fitted to it by means of multiple splines.

One camshaft is located directly in line with the exhaust valves, and the other in line with the inlet valves. The two shafts are geared together by means of helical gears. These gears are indexed to the cams, and, as the thrusts on the two shafts are in opposite directions, the timing and longitudinal positions of the shafts are accurately maintained. The bevel gear through which the camshafts are driven is bolted to a flange on the forward end of the exhaust camshaft, and timing is effected by means of a set of vernier holes. The thrust is taken on the back of the flange. The camshafts are supported in bearings mounted in aluminum brackets, one set of bearings between each pair of cylinders. The shafts are drop forged from low carbon steel, carbonized and hardened. They have the cams, the two helical gears and the necessary flanges forged integral with them. The cams are of the constant acceleration type, and give a lift of 0.406 in. On the intake camshaft there is an eccentric which may be used for driving a pressure air pump.

Directly in line with the intermediary shaft for driving the magnetos and camshaft driving shaft, but below the axis of the crankshaft, there is another vertical shaft which is used for driving the water pump, oil pumps and the tachometer. This shaft is driven from the same bevel pinion on the forward end of the crankshaft that drives the intermediary shaft. The water pump is lo-

cated at the bottom of the accessory driving shaft and is driven from it through a coupling joint. The gear housing is formed with pads over which the water pump, the tachometer drive housing, the magneto drive housings and the camshaft drive housings may be bolted. Magneto brackets are cast integral with the driving gear housing.

Zenith Carbureters

The K-6 is equipped with one and the K-12 with two 52-mm. Zenith duplex aero carbureters. Each carbureter furnishes mixture to three cylinders through a water-jacketed manifold. Ignition is by high-tension magnetos, of which two are used on both the 6-cylinder and 12-cylinder models. The magnetos are of the two-spark type, and each cylinder is provided with two spark plug bushings. The spark plugs are connected to the magneto distributors by cables enclosed in rectangular mica tubes.

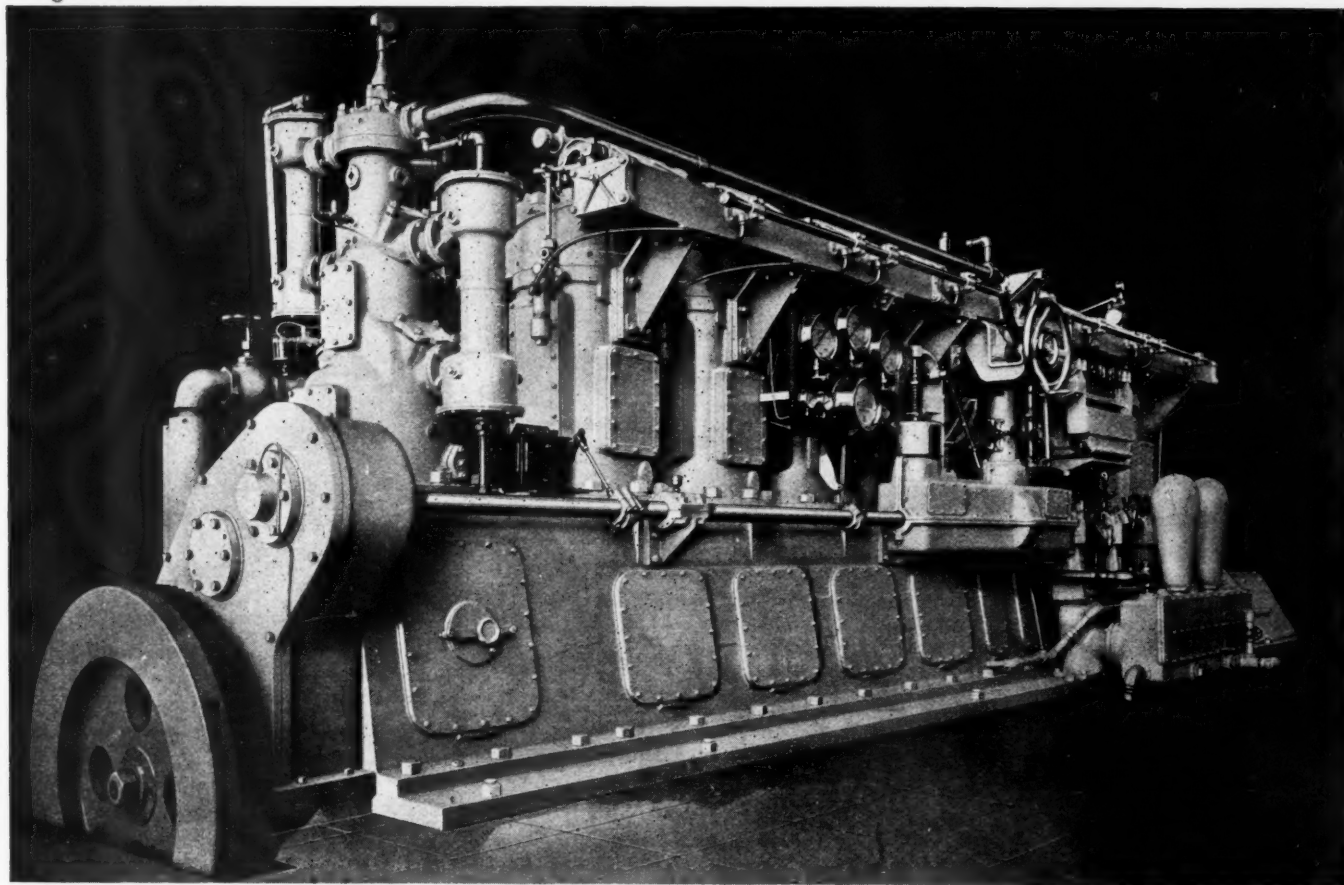
Lubrication is entirely by force feed, and, in addition to the pumps forcing oil to the bearings, there are auxiliary pumps which remove oil from the crankcase above the oil pan deck. The pumps are located in the lower part of the crankcase and are driven from the accessory driveshaft through a horizontal shaft. All of the gears are arranged in a single unit, which comprises two pumps for forcing oil to the various bearings, and a triple pump for emptying the oil out of the crankcase. Combined with the pump unit are the gear shafts and spiral gears for driving the pump, and the whole casting is surrounded by a fine mesh wire screen through which all of the oil is filtered. This screen is properly reinforced so that it cannot be damaged by excessive suction in case it should become clogged. Within the cover of the pump are the by-passes and spring-retained conical relief valves, which regulate the pressure under which oil is forced to the bearings.

The pressure pump draws oil from the sump through the screen and delivers it into the oil feed line. This line has a flange connection to the upper half of the crankcase, and at this point the oil enters the main distributor, which delivers oil to all main bearings. All of the journals of the crankshaft are hollow, and the main journals are provided with end caps. From these journals the oil is carried to the connecting rod bearings through small oil tubes built into the crankshaft. In the case of the K-12, the bearing at the lower end of the small connecting rod is fed from a bleeder hole in the connecting rod bushing. In the case of the K-12 also, the propeller shaft is oiled by a portion of the oil being bypassed around the bushings of the two rear crankshaft bearings through copper tubes to the propeller shaft bearings. A bleeder tube from the front propeller shaft bearing lubricates the upper reduction gears.

At the front end of the engine, oil from the front bearing bushing is carried through drilled holes and outside tubes to the cylinder heads. There the tubes have a sliding point with the revolving camshafts, which are drilled out, and the oil is fed to the camshaft bearings through the hollow camshafts and radial holes drilled through the camshaft walls. Provision is also made for lubricating the camshaft bevel gears and the valve stems, cam followers, etc. Any excess oil in the cylinder head runs down the camshaft drive housing and lubricates the bevel gears on the vertical shaft, and some of it is caught in two oil cups on the vertical shaft bearing and lubricates this bearing. The rest runs down into the front end of the engine. The sumps form a sediment chamber which may be emptied through a hole fitted with a screw plug.

An important feature of the lubricating system is an

(Continued on page 1094)



The new Winton Diesel engine which incorporates many automotive features in its design. Note the geared starting wheel, timing gear case and enclosed crankcase

Winton Diesel Engines

**Marine-Type Six and Eight-Cylinder Engines Built in 200, 300 and 500-Hp. Sizes
—Twin Valves, Enclosed Base, Pressure Lubrication and Other
Features Indicative of Automobile Influence**

AUTOMOBILE practice has been applied to a notable extent in the development of the new Diesel engines by the Winton Co., Cleveland. The result has been a marked similarity of appearance, and in many cases of design, with what has come to be recognized as standard characteristics.

There are three sizes of Winton Diesel engines. The smallest develops 200 hp. at 250 r.p.m., and has 11 x 14 in. cylinders. The intermediate size is of 300 hp. and, the same as the small type, has six cylinders, the cylinders in this case being 13 x 18 in. The same cylinders are used in the largest type, which is an eight-cylinder, rated at 500 hp.

Enclosed crankcases, trunk-type pistons, and crankshaft bearings solidly mounted in the upper half of the crankcase with bolted-on caps are the chief characteristics of the Winton Diesel engine as distinguished from other types.

The engine operates under 550-lb. compression, which is sufficient to cause preignition, thereby dispensing with electrical ignition. The fuel pump is a plunger type, with one plunger for each cylinder. It delivers the fuel to the fuel injection valve under a pressure of from 1000 to 1200 lb., depending on the pressure of the fuel injection air. The stroke of the fuel pump is constant, the amount of fuel delivered being controlled by the early or late closing of the pump inlet valve by the governor. On the Winton

Diesel engines an adequate supply of fuel is always assured by the fact that the fuel oil is lifted to the fuel pump from the tank by 10 to 15 lb. air pressure, which is sufficient to secure plenty of fuel at the pump inlet valve.

Since these engines work on the true Diesel cycle, the fuel is forced into the cylinder against a compression of 550 lb. by the use of air at about 1000 lb. pressure. This not only carries the fuel into the cylinder but breaks it up into very fine particles so that combustion is complete. The high-pressure air for this purpose is obtained from a three-stage air pump mounted at the front end of the engine.

This pump is of interesting design, the piston being of the trunk type, operated by a connecting rod which is a duplicate of the connecting rods in the power cylinders, and a single-throw counterweighted crankshaft, which is bolted to the front end of the main crankshaft. The throw of this single crank is somewhat greater than that of the power shaft.

The capacity of the air compressor, being considerably in excess of that required for the injection of the fuel, provides for the initial charging and maintenance of pressure in the storage tanks, or air bottles, which are used for starting the engine. There are two sets of these air bottles, one carrying the air at about 600 lb. pressure per square inch, which is admitted to the cylinders in turn, to force the

pistons down, starting the engine rotating. The second set of air bottles carries air at 1000 to 1200 lb. per square inch. This is used to inject the fuel into the cylinders, thus starting the engine running under its own power. As soon as the fuel is injected the compression pressure raises the temperature to such an extent that it at once starts to burn.

It will be noted from the following description that a great many of the structural points are very similar to those found in motor truck and motor car practice. The crankcase is of gray iron and cast in one piece, of skeleton construction, the sides having large openings opposite each throw of the crankshaft, these openings being provided with cover plates, affording easy access to all parts of the interior. A main bearing for the crankshaft is provided on each side of each throw, each bearing being supported by heavy ribs so as to give the desired rigidity. The lower part of the crankcase forms an oil pan, which, as in motor-car practice, extends from the timing gear in the front to the rear of the thrust bearing at the back end of the engine. This gives a fully enclosed oiling system.

The cylinders are cast individually, with integral water-jackets. There are large cover plates provided on the water-jackets so as to permit them to be cleaned readily if necessary. The cylinders are bored and ground.

The cylinder heads are secured to the cylinders by studs and nuts, so arranged that the pressure is uniformly distributed. Each cylinder head carries five valves—two for the incoming air, two for the exhaust and one for the injection of the fuel. The head also carries the rocker mechanism by means of which these valves are operated.

The pistons are about 75 per cent greater in length than in diameter. The piston-pin bosses are located about one-third of the diameter up from the bottom of the piston, which brings them about the center of the effective bearing surface. The length of the bosses is such that the bronze bushings can be inserted from the inside. As each bushing is flanged it is thus locked against endwise motion when the connecting rod is in place. The piston tops are dished, giving the necessary compression space, and there are heavy ribs from the top of the piston to the side walls and the bosses. The piston is also strengthened by a rib around its inside just above the bosses.

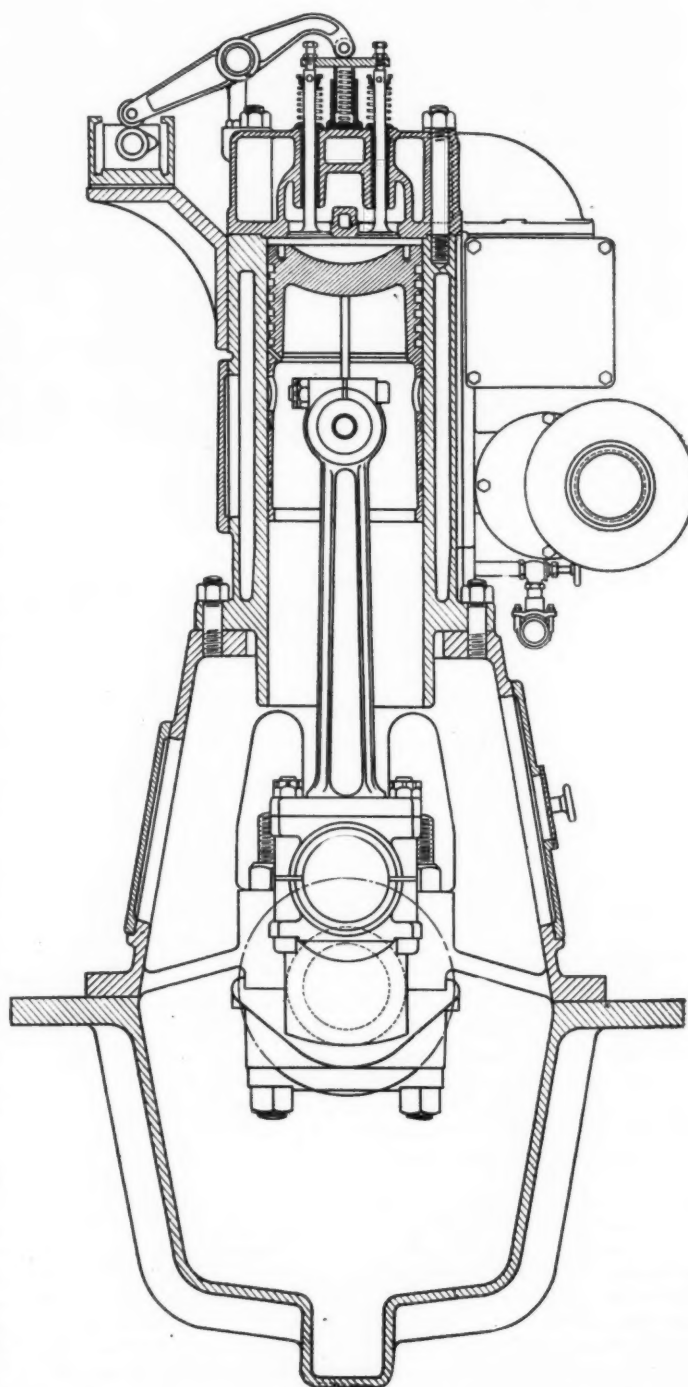
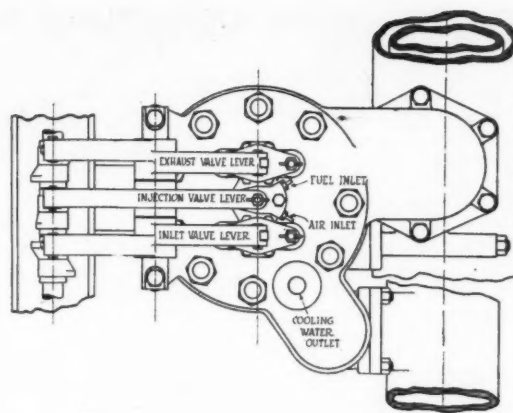
To prevent oil working up above the piston rings a groove is turned immediately below the lowest ring, and from this groove a number of holes lead back into the inside of the piston. To prevent oil splashing up under the lower side of the head, where it would be burned and blackened, the hole through the rib around the inside of the piston is enclosed by a sheet-metal plate.

Each piston has a hole through each side, midway between the pin bosses and slightly above them, through which it is possible to handle the bolt which clamps the upper end of the connecting rod around the piston pin.

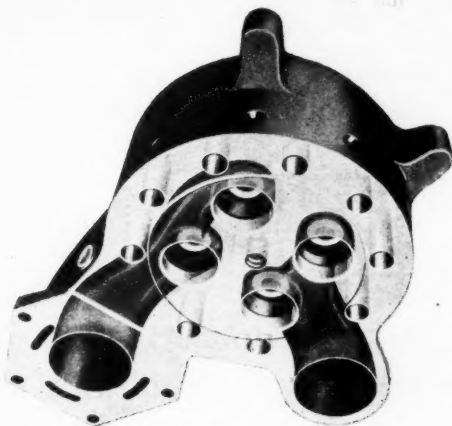
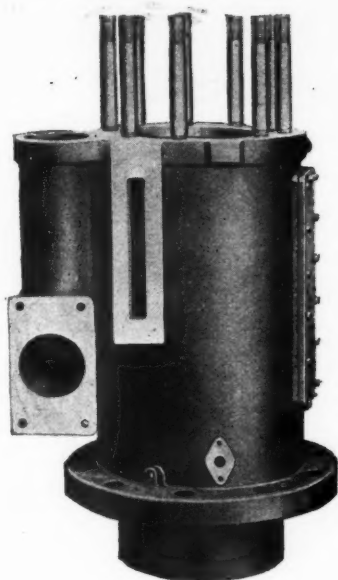
The connecting rods are I-section forgings, split at the upper end and clamped around the piston pins, and formed into a T-head at the lower end, to which two half-boxes and a supporting cap are bolted. Each rod has an oil tube connecting with the groove in the upper half-box and leading upward to the piston pin. The piston pin itself is hollow, with its ends plugged, and is drilled near each end so that oil is fed directly to the bushings in the piston. The tube and piston pin are thus filled with oil under pressure from the pump, and adequate lubrication of the piston pin is insured. The piston pin is case-hardened and ground and bears on bronze bushings pressed into the bosses in the piston.

The crankshaft is made in three pieces, two sections having each three or four throws for the power cylinders, and the third section having a single throw for the air compressor. These sections are flanged and bolted solidly together before being assembled into the crankcase.

From each main bearing of the shaft a hole is drilled through the adjacent web to the crankpin. These holes register with grooves in the main and connecting rod bearings so that the connecting rod lower bearings are also lubricated under pressure directly from the pump. Each bearing has an individual oil lead to a header running the full length of the crankcase. This header is connected to a two-cylinder reciprocating oil pump which maintains con-



Transverse section and plan view of Winton oil engine, model W 24 A, 12 15/16 in. bore by 18 in. stroke



Left—One of the cylinders from the Winton Diesel engine
Above—The cylinder head, showing the five valves, two for incoming air, two for exhaust and one for fuel injection

stant oil pressure on the bearings. Further details of this pump will be given later.

The camshaft is supported in a long box-shaped casting open at the top, which in turn is supported on brackets from the cylinders. This trough is partly filled with oil, insuring ample lubrication to the cams and camshaft bearings. The driving gears are fed directly with oil under pressure from the pump.

The camshaft is driven by bevel gears from a vertical shaft near the center of the engine, which in turn is driven from a lay shaft and a train of spur gears at the front end.

The camshaft is provided with two complete sets of cams, for forward and reverse motion respectively. Shifting the shaft endways by means of a handwheel and suitable mechanism brings either set of cams into operation. The shift from full speed ahead to full speed astern is guaranteed in 6 sec., and is frequently accomplished in 5 sec. Considering the weight of the parts which must be brought to rest and started in motion in the opposite direction, this is a wonderful performance.

Reversing the Engine

The procedure required to reverse the engine is as follows:

- 1—Close fuel-oil supply valve.
- 2—Shift camshaft.
- 3—Open fuel-oil supply valve.
- 4—Open valves controlling starting air.
- 5—Close starting air valve.

Each pair of inlet and exhaust valves is operated from the camshaft by a single rocker arm, the valves being connected by a T-head slide on which the end of the rocker rests. The slide is carried in contact with the rocker at all times by a coil spring in the center of its hollow stem. Each end of the slide carries an adjusting screw and locknut by which the clearance between the ends of the valve stem and slide can be adjusted. This clearance is 0.015 in. for both main inlet and exhaust valves. These pairs of valves are used instead of single large valves, as the small valves are much less apt to warp under the high temperatures to which they are exposed. This agrees with practice in high-powered aviation and motor-car engines.

The fuel-injection valve is located in the center of the head and is also operated by a rocker from the camshaft. The adjusting screw for this valve is set to leave 0.025 in. clearance when the valve is closed. All these clearances are those for a cold engine, and will be somewhat less as the engine warms up.

The valve timing, as regards the air inlet and the exhaust valves, is very close to an average four-cycle gasoline-engine valve timing, the figures being as follows:

- Air intake opens 5 deg. before upper center.
- Air intake closes 25 deg. to 30 deg. after lower center.
- Exhaust opens 40 deg. before lower center.

Exhaust closes on top center.

The timing of the fuel injection valve is as follows:

Valve opens 7 deg. before upper center.

Valve closes 25 deg. after upper center.

High-pressure-injection air flows all the time the injection valve is open. Fuel is injected, however, during part or all of this period, depending on the amount of power required from the engine. The amount of fuel is controlled by a centrifugal governor which limits the duration of the fuel pump suction as may be required to maintain the engine speed.

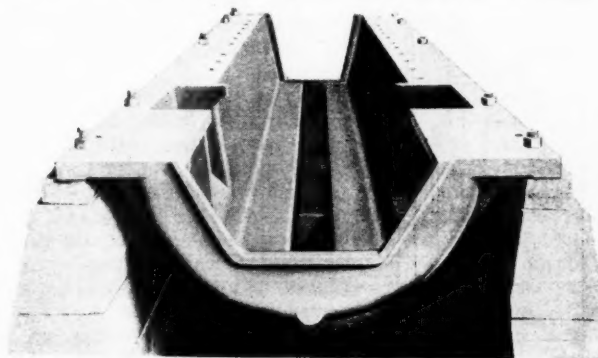
Cooling water is circulated through the jackets of the engine cylinders and air compressor by a four-cylinder plunger pump operating from the same small crankshaft which handles the oil circulating pump. This shaft is about the same size as would be used in large six-cylinder automobile engines, but looks extremely small by comparison with the rest of the powerplant.

The oil circulating pump which provides lubrication for all the main bearings of the engine really consists of two single-cylinder pumps. The one driven from the end throw

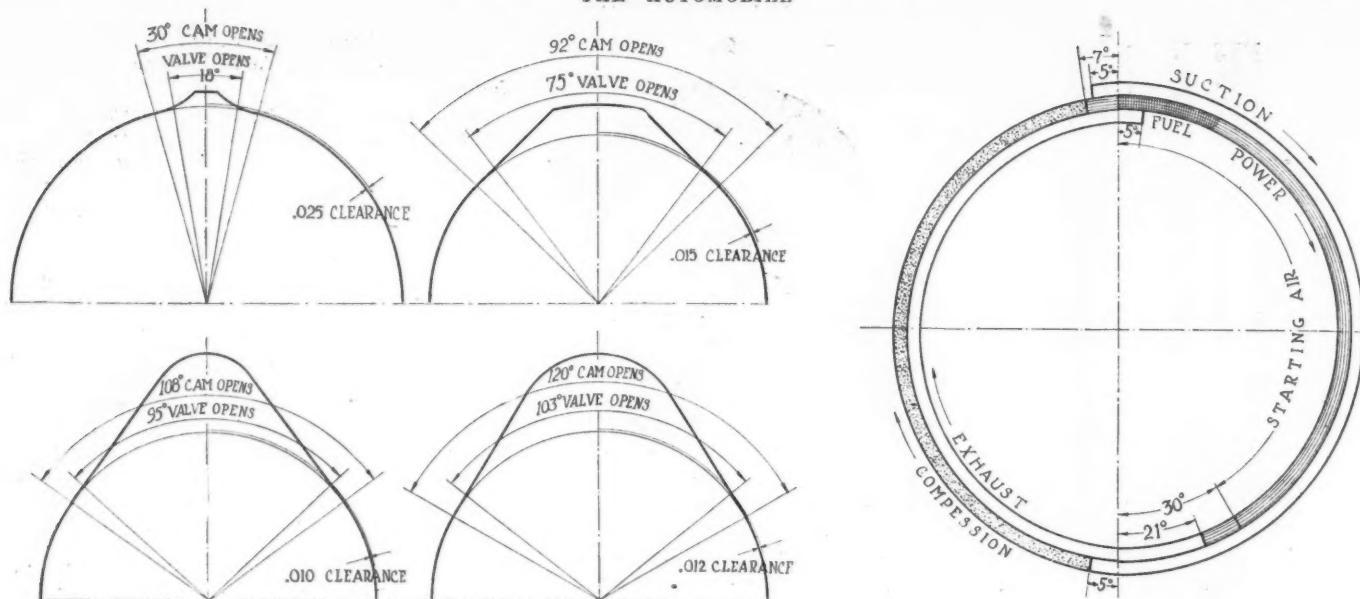
of the crankshaft operating the circulating water and lubricating oil pumps draws the oil from the sump in the lower half of the crankcase and forces it through a cooler and a strainer to a storage tank. The other single-cylinder pump draws the oil from this storage tank and forces it into the header, from which it is piped to the bearings, as described above. The discharge side of this pump is provided with an air chamber to insure constant pressure being carried on these bearings. The circulating water pump is of the four-cylinder type, and also has an air chamber on the discharge side to insure steady circulation of the water. The cylinders, pistons and stuffing-box glands are made of bronze to prevent injury by the water.

The supply of air for starting the engine is carried in steel air bottles, which are from 12 to 18 in. in diameter and 10 to 20 ft. long. These are stored wherever convenient on the ship and are connected by heavy brass tubing to a header running the full length of the engine. At the point where the pipe from the air bottles join this header is located a valve, which can be opened by pulling on a long handle. This admits the air to the header.

Each cylinder is connected to the header by means of a pipe in which is located a valve operated regularly by the camshaft. The end of this pipe connected to the cylinder is fitted with a special casting containing three valves. The first is a check valve to prevent the compression or power-stroke pressure from escaping from the cylinder. The second is an overload valve or safety valve, which is set to open if the pressure in the cylinder exceeds normal power-stroke pressure. A valve of this type is necessary to prevent damage to the cylinder or piston in case water or oil should accidentally collect in the cylinders. If this happened and the engine was started, the top of the piston would probably be broken out, as water or oil is practically non-compressible. The third valve in this casting is operated by a small hand-wheel and is opened only when it is desired to attach an



Oil pan of the Winton Diesel engine



Cams and cam setting on the Winton Diesel engine

indicator to determine the work being done by the cylinder.

Contrary to automotive practice, the exhaust is not fitted with a muffler close to the engine, but the air inlets for both air compressor and the main cylinders are carefully muffled. The air inlets to the main cylinders are connected to a large header, into which air is taken through a muffler at each end. This arrangement of drawing the air for the engine directly from the engine room has the decided advantage of constantly drawing fresh air into this room, thus insuring ventilation.

The thrust block at the rear of the engine has a unique feature, in that the thrust surfaces are lubricated under pressure from the engine oil pump. The thrust block consists of a short, heavy shaft flanged at both ends, one flange being bolted to the rear flange on the crankshaft. Turned integral with this shaft are a number of large collars between which the horseshoe-shaped thrust segments are mounted. Each of these segments is faced with babbitt on both sides and has

a connection at the top to an oil lead from the pump. The babbitt facings are grooved so that the oil is distributed under pressure over the entire thrust surface. The segments are held in the proper position by nuts on heavy threaded shafts along each side of the thrust block. They are consequently readily adjustable for wear. They also are reversible, so that if the babbitt should wear or burn off one side a new bearing surface could be brought into operation by a few minutes' work.

Pressure Delivered by Air Compressor (Test data)

High-pressure cylinder..	1050	1200	1175	1150	1225
Intermediate cylinder...	200	295	280	280	325
Low-pressure cylinder..	60	60	60	60	60

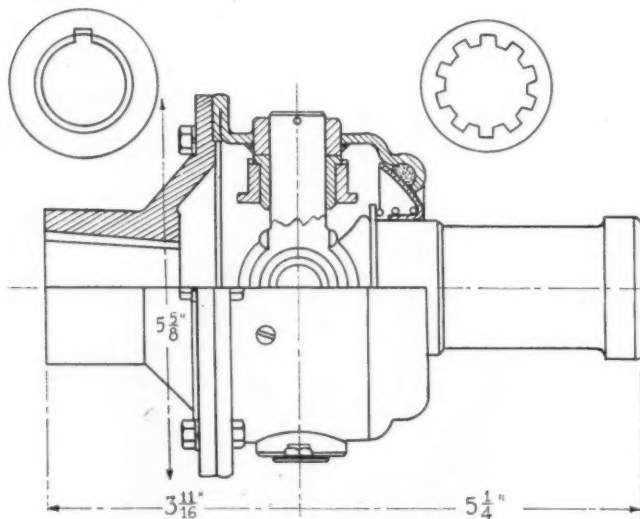
Camshaft runs half engine speed.

Oil and water pumps run two-sevenths engine speed.

New Standard Universal Joint

THE Universal Machine Co., Bowling Green, Ohio, has brought out a "4000 series" of its standard universal joint. This joint is only 5 5/8 in. in diameter, and is said to be suitable for the largest 7-passenger car. It is of light design, weighing with flange only 9 lb.

The shell or casing is a stamping of 1/8-in. steel and has



Part sectional view of Standard universal joint

two hubs for the joint pins welded to it by the acetylene torch. Being made of such heavy material, there is no danger of the shell being dented by flying stones or through other causes. The yoke and hubs are made of drop forgings, and the pins and bushings are of carbonized steel hardened and ground. The joint is completely enclosed, use being made of an oil retainer, in the form of a spherical segment, and of packing between it and the shell. Thus the oil is kept in and the dirt out. Suitable oil grooves are provided for all bearings. The joint itself is furnished completely assembled, and all the customer has to do upon its receipt is to secure the flange on the shaft and then bolt on the joint.

This type of universal joint is furnished as a single joint, and also in double joints, assembled with either solid or tubular shafts, and equipped with a hardened, splined slip connection. This connection is provided with a grease-retaining felt and steel washer, and adjustable clamps.

ACCORDING to a recent address by Captain Guillet, France in 1913 consumed 70,000 magnetos, of which 94 per cent were of German manufacture. Upon the outbreak of the war the magneto question became simply alarming. Both the aircraft and automobile industries developed rapidly and demanded a constantly growing number of magnetos. It was necessary to greatly increase the manufacture of these devices, by enlarging existing plants and establishing new ones, and the effort made was such that toward the end of the war France became the principal source of magnetos for the Allies.

Present Status of German Motor Industry

War Strain Has Worn Out Shop Equipment and Made Inroads on Supply of Skilled Labor—Country Stripped of Automobiles, But Materials Are Scarce

AS in other European countries involved in the world war, in Germany the automobile industry has greatly expanded during the past four years, but it has been engaged largely on products other than those which it turned out previously. During the war we had occasional brief notices regarding the activities of individual concerns and the prosperity of the industry as a whole. From this the conclusion might have been drawn that the German automobile industry was in a strong position and likely to become a formidable competitor in the world's markets, but a rather different view of the situation is taken in a lengthy report from United States Vice-Consul Robert L. Gray, Jr., of Lucerne, Switzerland, which has just been made public by the Bureau of Commerce.

According to this report, before the outbreak of the war Germany was equipped and able entirely to supply its own market for passenger cars. The number of automobile factories established in Germany was 38, all German owned and controlled. These factories were located in East Prussia, West Prussia, Rhineland, Bavaria, Baden, Wuertemberg, Saxony, and Hessen.

Present Scarcity of Trucks

The 43 automobile factories now existing in Germany—the war produced five new factories—have concentrated all their efforts to produce trucks for the army during the war. In 1917 and 1918 between 10,000 and 12,000 trucks—3-ton trucks of standard type—were produced. This represented the maximum output of production for one year. In all about 40,000 trucks have been manufactured during the period of the war. Four and more ton trucks have not been constructed to any great extent, because this type of truck was not used by the German Army. It was predicted and anticipated that in the event that peace came by the end of 1918 about 39,000 to 40,000 trucks would be returned by the army and placed at the disposition of the German people. Owing, however, to the terms of the armistice and to the rapid retreat of the German armies across the Rhine, hardly more than 9000 trucks were brought back, and these were all in very bad condition, almost unfit for further use. Again, it is worthy of note that the German construction of trucks is far behind what it should be. This is due to the lack of modern machinery, skilled workmen, and the hasty construction demanded by the military authorities. Also the lack of copper, tin, zinc, and especially of nickel and chrome, necessary for the production of the high-grade steel needed in truck construction, has greatly hindered the production of modern and durable cars.

Principal Truck Manufacturers in Germany

The following listed factories represent the principal automobile manufacturers in Germany who during the war manufactured only trucks. The figures quoted show roughly the maximum capacity of truck production for one month, reached during the period of the war:

	Trucks Per Month
Wuerttemberg:	
Daimler, Stuttgart	100
Baden:	
Benz Gaggenau	100
Union, Mannheim	15

	Trucks Per Month
Bavaria:	
Saurer, Nuremberg	45
Faun, Ansbach	30
Prussia:	
N. A. G., Berlin	120
Bergmann, Berlin	40
Loeb, Berlin	40
Protos, Berlin	50
Hansa Lloyd, Bremen	100
Komnick, Elbing	60
Pomerania:	
Stoewer, Stettin	60
Westphalia:	
Duerrkopp (Bielefeld)	40
Rhine Province:	
Mannesmann }	90
Daag }	
Saxony:	
Vomag, Plauen	70
Horch	60
Hesse:	
Opel, Russelsheim	70
Adler, Frankfurt	60
Total maximum production for one month....	1,150

The remaining 24 factories are small concerns, engaged principally in the manufacture of motorcycles, motor side cars, munitions, and other war material.

Before the war the total production of trucks amounted to about 100 per month, Daimler, Benz-Gaggenau, and Hansa Lloyd being the principal manufacturers. During the war all the factories have been so enlarged that, together, they have been able to produce on an average of from 1000 to 1200 trucks per month. This includes the five new factories established and a number of the smaller concerns, not mentioned above, which produced from 2 to 10 trucks, respectively, per month.

Prices Nearly Doubled

During the war tractors were not made in Germany to any great extent. The Hansa Lloyd factory in Bremen manufactured tractors on a small scale, producing about 12 tractors per month. Though German manufacturers were engaged in developing a standard type of tractor they did not progress beyond the experimental stage.

It is hardly possible to give an exact idea of the prices the German manufacturer will be obliged to charge for passenger cars after peace has been signed. It is estimated that an increase of from 50 to 75 per cent is the least that can be expected. Prices of trucks advanced during the war about 75 to 100 per cent. Before the war the 3-ton truck, 45 to 55 horsepower (N. A. C. C. rating), sold at from 14,000 to 15,000 marks, without tires. The German Army at the beginning of 1918 paid 28,000 marks for a 3-ton truck, including steel tires.

From the commencement of the war all rubber tires, of whatever description, were confiscated by the German military authorities, and it was not long before the available supply was completely exhausted. In fact, the lack of tires in Germany became so serious that the German general staff was forced to limit the use of passenger cars needed for military purposes at the front. A large number of mechanical inventions calculated to replace the no longer obtainable pneumatic and solid rubber tire, especially those for use on trucks, were placed upon the market and tried out. However, no matter how good was the substitute produced, it never approached the point where it could be compared in

any way with the much-needed rubber tire, and in the end was cast aside as worthless. After the failure of the many invented substitutes to relieve the situation, all trucks were put on steel tires. This necessitated the reinforcement of the bearing parts of the trucks, at a considerable increase in the cost of construction. Even then the life of the truck was shortened, and it was not very long before the car was practically jolted to pieces or in a very dilapidated condition, making continual repairing necessary.

Synthetic Rubber Inadequate

From the first days of the war hope was placed in the ability of the German chemist to solve the problem of producing synthetic rubber and thus supply the urgent need of rubber required for all purposes in Germany. Especially was it hoped and confidently expected that it would not be long before synthetic rubber would be produced in quantities sufficient to enable the wholesale production of the greatly needed rubber tire. This dream was never realized. Although the German chemist did succeed in producing synthetic rubber, the product could not replace the natural rubber. This was due to the lack of elasticity, durability, and the high cost of production of the synthetic rubber. A large amount of this rubber was manufactured and mostly used for insulating purposes, in the construction of submarines, torpedo boats, electrical engines, etc., where it offered a good substitute for the natural rubber required. However, the synthetic rubber did not relieve or in any way affect the tire situation.

Large amounts of natural rubber belonging to German manufacturers are stored in neutral countries. With the signing of peace it is expected that this rubber will be released and the manufacture of solid rubber tires started immediately. Owing to the lack of cotton in Germany, it will be impossible for some time to come to manufacture pneumatic tires. In any event, the demand for rubber tires will be enormous, and Germany is not able to supply it.

Proposed Plans for Protection

On Nov. 18, 1918, the president of one of the largest automobile factories in Germany, and one of the most prominent men in the German automobile industry, addressed a meeting of about 75 representatives of all the automobile manufacturers in Germany. The meeting was private and no mention of the proceedings was made in the newspapers. In his speech he called special attention to the fact that the future standing and existence of the German automobile industry will depend entirely upon the ability to meet and cope with foreign competition. He proposed a consolidation of all the manufacturers, stating that every one must stand together and work for the common good of all, and that only by such united effort would they be able to succeed in meeting foreign competition. He also proposed to send carefully selected engineers, mechanics and automobile business men to the United States for the purpose of studying American methods of manufacture and organization, and to engage American engineers to come to Germany for the purpose of introducing American methods of manufacture and to modernize the German automobile industry. At the request of the assembled manufacturers, printed copies of this speech were sent to all members of the "Verein Deutscher Motor Fahrzeug Industrieller" (Society of German Automobile Manufacturers), Berlin, with the purpose of bringing before them the danger to be feared from foreign competition. What effect this speech will have is, as yet, unknown, but the fear is well founded and apparent, because Germany is not now, and will not for some time be, in a position to put this industry back upon the footing it occupied before the war.

Field for American Cars and Parts

In spite of the fact that Germany has lost the war, and in view of the facts above stated, there is no question that Germany will offer a good field for the introduction of American automobiles, trucks, tires, etc. In spite of the German Government's action in placing a luxury tax of 10 per cent upon all passenger cars, the number of prospective buyers is very large and continually increasing. The "Verein Deutscher Motor Fahrzeug Industrieller" is fighting against

the 10 per cent luxury tax imposed by the Government, on the ground that it considers the automobile to be a necessity rather than a luxury. Likewise, all the leading business men and commercial newspapers are opposing the tax upon the same ground.

The war has also shown to Germany that the automobile is a valuable, quick and effective means of transportation, and its use in a strictly commercial sense is understood and fully appreciated by the German business man. In the larger cities in Germany, since the armistice, large companies with several millions of marks of capital have been formed for hauling and delivery purposes and for renting trucks.

Disposition of Army Trucks—Establishment of Truck Lines

Most of the 9000 to 10,000 trucks returned from the front have been purchased by the organizations above mentioned. Some of these companies are private, others have been subsidized by the State, and in the near future it may be expected that a great number will be established and controlled by the Government. In Bavaria an official declaration of the Minister of the Interior, department for traffic, has been issued, proposing to control the road traffic on trucks in the same manner as the railroads are controlled. In other words, truck lines will be established and run in connection with the railroads which are Government owned. This official monopoly, however, can only be ratified by the National Assembly. Before the war Bavaria was the leading German state operating and maintaining an autobus line, which replaced direct railroad connection between cities in the mountainous parts of Bavaria. It is now the intention to supplement this with a truck line for the freight traffic. This measure is viewed with great favor by all large commercial enterprises and individuals throughout Germany, who see in it a great advantage for the development and re-establishment of interstate commerce and trade after the war. Since the signing of the armistice large sums of public moneys have been appropriated by many provincial officials for the immediate reconstruction and improvement of the public highways. This work will give employment to thousands of discharged soldiers, and at the same time tend greatly to develop and improve the interstate commercial relations in many respects.

Condition of the German Railways

When consideration is given to the fact that the condition of the railroads in Germany is very bad, roadbeds in a neglected, run-down and extremely worn-out condition, rolling stock greatly depleted and in an almost ruinous state of repair, owing to the lack of proper lubricants and to the enormous demands made upon it during the four and a half years of war, it can readily be seen that the railroads must be supplemented by the automobile and trucks, especially with respect to freight traffic. The horse has almost disappeared from Germany.

There is no doubt that a great demand for motor cars of all kinds will arise throughout Germany. As conditions are now, it will be very hard, and in fact impossible, for Germany to manufacture an automobile or a motor truck at a price low enough to compete with American prices. Conditions have never been so favorable as now, in many respects, for the introduction of American automobiles and trucks.

Improper Selling Methods

Of all the foreign producers the American automobile manufacturer and exporter has been in the most disadvantageous position. Before the war several American firms exported motor cars to Germany, but no great success attended their efforts. This was due to a number of reasons, chief among which the following are worthy of notice: (1) The unskillful selection of the importer by the American producer. For instance, cars were sold to German importers who knew very little about the automobile business or who selected agents who were not capable to represent the car. (2) Lack of interest shown by importer in car after sale. When a car was sold the importer or his agents lost all interest in the buyer, and nothing was done, in many instances, to keep in touch with him or to look after the welfare of the car. This tended to create dissatisfaction among the buyers of American cars. (3) Lack of knowledge in many cases by

the importer and agents of the importer of market conditions. (4) Wrong methods employed to introduce American cars. This applied to advertising methods, lack of a well established and equipped repair shop, and choice of location and establishment of agencies.

The policy of many of the large automobile manufacturers in the United States of granting an agency or sole agency for a foreign country to a foreign importer upon the conditions that the importer should buy the car or a certain number of cars outright, f.o.b. New York, etc., and should have an established sales organization, be financially able to buy the cars outright, and guarantee to sell a certain number of cars per year, is not the proper method of procedure and will not result in the establishment of a permanent market or in the successful introduction of American cars to foreign markets. The moment the car is received by the importer it is alone in a strange country, duplicate parts are not readily to be had, the car is in the hands of mechanics who do not thoroughly understand its mechanism and construction, and are, therefore, not able to effect good repairs, and, in general, the foreign importers are not interested in the welfare of the car or in the satisfaction of the buyer after the sale.

Proper Methods for Establishment and Location of Agencies

It would be advisable and of great advantage to the American producer desiring to create a lasting market to establish his own agency in the prospective foreign territory. In the event that he desires to do this great care should be given to its establishment and organization and to the selection and location of the principal office and subagencies. This part, especially with respect to the selling end, should be placed in the hands of a man who is thoroughly familiar with the country, people, language, methods of procedure, and organization employed in this instance by the German automobile industry, and who has large and influential connections in the country and good experience in the automobile business. This is especially necessary for the selection of sales agents.

With respect to location, Berlin and Munich are the two principal cities to be considered. Munich more so than Berlin, because the latter city and Prussia, in general, have undoubtedly lost during the war a great deal of former influence and prestige. In the event that German Austria, with Vienna as the principal city, decides to throw in its lot with Germany, Munich would be the best choice for the head office.

In connection with an established agency, it is of great importance to have a well-equipped repair shop, including a large stock of duplicate parts. There is no doubt that a prospective customer would be largely influenced by the possibility of having his car repaired by the original firm and of being able to secure duplicate parts at once. The establishment and maintenance of a well-equipped repair shop will support the sale of the car by at least 50 per cent.

It is advisable to say a few words regarding the methods of advertising as carried out in Germany with respect to the automobile. The German method of advertising cannot be taken as an example of the right method, because it does not bring before the public a proper and strong conception of the idea involved. In any event, the German does not attach the importance to advertising the American producer does. While the American methods of advertising, as carried out in Germany, have been excellent in many respects, they have not been in such form and style as to attract especially or appeal to the German conception of things. Also mistakes have been made in the manner of placing the advertisements before the public and in the selection of the proper papers to carry them.

German Sales Methods

Until shortly before the war all German automobile manufacturers were selling their cars on a commission basis. A certain specified territory was allotted to a commission agent for a number of years as stipulated by contract. The agent was required to sell a certain number of cars per year or else forfeit his contract, or placed in a position which eventually necessitated him to relinquish his agency in the event he could not dispose of the number of cars he was under contract to sell. Every car was sold at a fixed price set by the manufacturer. In case the agent sold this car at a lower or

higher price he forfeited his contract. The agent's commission was included in this fixed price. When, toward the end of the year, an agent saw that he had not sold his required number of cars and would not be able to do so before the end of the year, he immediately set to work to sell the car at a price much lower than the set factory price. This reduction sometimes involved the sacrifice of his entire commission on the sale of the car at the normal price, and in some instances, where the situation was desperate, the agent sold the car at a price which not only involved his entire commission but required him to make up the price at which the car was sold to him by the factory. Of course, the buyer of the car paid the set and fixed factory price to the agent, however, with the understanding, made beforehand, that the agent would make him a present, before or after the purchase, of 1000 marks, or of a horse, gold cigarette case, diamond ring, etc., according to the terms of the discount offered by the agent in order to effect the sale of the car. Again, inasmuch as the agent was naturally controlling the market in his allotted territory for the sale of the car represented, it was not long before he was demanding higher commissions and a better contract with the producer. If the agent's demands were not granted he, in many cases, simply took another representation at the expiration of his contract with the manufacturer and did everything possible to influence the market against the car formerly represented by him, and in this he generally succeeded. In fact, conditions were such that the agents were, to a great extent, controlling the producers. In order to protect their interests the producers formed a combination to bring pressure to bear against the agents and their methods, and to prevent what threatened shortly to be the complete control of the producer by the agents. This organization of the producers was known as the "Verein Deutscher Motor Fahrzeug Industrieller" (Society of German Automobile Manufacturers).

This resulted in the agents combining and forming an organization known as the "Deutscher Automobil Haendler Verband" (Union of German Automobile Agents), to counteract the combination formed by the producers. This resulted in the producers, starting with the larger manufacturers, installing their own agencies in all of the large cities in Germany and elsewhere, as soon as the contracts with their former agents had terminated. The smaller companies, in a great many cases, soon followed suit. In all the large cities in Germany there will now be found branches of the principal manufacturers with offices and exhibitions. As this system was introduced only shortly before the outbreak of the war, it is impossible to give statistics of comparison of a reliable nature. However, the results obtained so far have been extremely satisfactory.

INDUSTRIAL GOODWILL

INDUSTRIAL GOODWILL. By John R. Commons, University of Wisconsin. New York: McGraw-Hill Book Co., Inc. Price, \$2.

This book deals with the labor question from the industrial standpoint. It deals with the commodity theory of labor, with the machinery theory of labor, with the position of goodwill as a labor matter, the concern of the public, the question of democracy, the solidarity of labor, education, health, insurance and other similar matters.

The book presents cases for the various subjects and the conclusions in a very simple, practical form, and it contains a great deal of information which it would be well for all men connected with the handling of labor to have available and to understand.

It does not attempt to deal with the organization question as such, nor does it bring in the political and social side to any great extent.

As it stands, it cannot be considered as a complete exposition of the relations between employer and employee or of the deficiencies of the present methods of organization and outlook. It attempts to cover only certain specific branches of the subject and in respect to those branches the information is accurate and valuable, the material is well presented and readable and should prove of interest to those who have either control or supervision of labor.—HARRY TIPPER.



Nieuport airplanes supplied by the French to the American army

The Airplane Supply System

of the American Army in France—II

The Advance Depots—Handling 18 Tons of Materials a Day for Seven Months
at One of Them—The Balloon Supply Service—How Automobile
Equipment Was Provided

By W. F. Bradley

IN any system of supply, whether it be civil or military, it is rarely sound policy to ship direct from the producer to the consumer. Under war conditions such a policy would be suicidal. The men who are doing the actual fighting must be relieved of all responsibility connected with the furnishing of supplies. The infantryman, whether he is hard in pursuit of the enemy or whether falling back in a stubborn fight, expects to be provided at all times and under all conditions with the two essentials, food and ammunition. The men who fight in the air need the same essentials, but in addition they call for a host of detail and highly specialized articles, the loss of any one of which might spell disaster.

An aviation squadron is the most mobile unit under the sun. Almost at a moment's notice the machines can be prepared for flight, and after an hour in the air they can be at some new location 100 miles from their original base. By reason of automobile transportation their squadron equipment can be brought to them at such a new center within 24 hours. Such changes may come two or three times in one week, or they may not have to be made more than once in several months. In war it is necessary to be prepared for all emergencies.

Because of these constantly varying circumstances, it is necessary for the big supply centers in the rear to furnish material to advance depots, which in turn distribute to the squadrons in the field. The Air Service of the American Expeditionary Force established its most important advanced depot at Colombey-les-Belles, 11 miles south of Toul, at which point there were 90 officers and

2000 enlisted men receiving airplane motors, propellers, spares, hardware, instruments, clothing, etc., and distributing them, as requisitioned, to the squadrons in the field. In other words, this was a retail store, but a retail establishment which did business on a big scale, for during the month of September alone this depot handled 2595 requisitions, each requisition comprising from 40 to 50 articles. The regular clients of the depot in the month of October, 1918, were 23 headquarters groups, 16 observation squadrons, 4 bombardment squadrons, 20 pursuit squadrons, 12 park squadrons, 8 photographic sections, and 22 balloon companies.

What Was Done at Colombey

The standard requirements of an air force in the field are infinitely varied. Some of the big lines are gasoline and lubricating oil. Thus, while it was in active operation, from April 1 to Nov. 11, the depot at Colombey-les-Belles sent out 206,000 gal. of transportation gasoline, 280,000 gal. of aviation gasoline, 167 gal. of special fighting gas, more than 47,000 gal. of castor oil, and about the same quantity of Mobiloil BB. At the other end of the line were the small articles: altimeters, speed indicators, engine parts, special aviators' clothing, which do not look big in statistics, but which are absolutely essential to successful operation.

In addition to furnishing these regular consumable stores, Colombey was the receiving center for foreign airplanes despatched from Orly and American airplanes sent out of Romorantin. In nearly all cases the ferry

pilots landed the machines at this point, from which they were taken in a single short flight to the squadrons located in the immediate vicinity of the line. These new machines sent out to make up losses, or to form new squadrons, were replaced by wrecked or partly wrecked planes in an almost equal number. Colombey received these crashes in all sorts of conditions. Some were subjects for the junk pile, in which case whatever accessories could be saved were taken off and put into storage. Others were capable of rebuilding and of going into service again. In the month of August, when the battle was at its height, the airplane repair depot at Colombey received 175 crashed planes. Of this number it was possible to repair 52 and return them to active service. Up to the signing of the armistice a total of 237 crashed planes had been repaired and sent back into the fight.

Advance Depot No. 1

Ninety miles from Colombey was another depot, known as Advanced Depot No. 1, at Is-sur-Tille, where, with a storage space of 70,000 sq. ft., clothing and airplane parts, machinery and tools were handled and sent out to 40 different units of the A. E. F. This was a quick-action center, for of the requisitions received 90 per cent were executed and the goods delivered within 24 hours. For seven months this depot handled 18 tons of material a day. At Vinets, in the Zone of Advance, sufficiently far up for a short single flight to the front, was another spare parts depot and ferry station. Further back, at Chatenay, on the mail railroad line from Paris to Chaumont, still another depot got into its full stride only a short time before the armistice came.

Special Section of Balloon Companies

While a part of the Air Service, the balloon companies form a specialized section with altogether special material. Working usually in conjunction with the heavy artillery, their captive balloons have to be in the air whenever weather conditions are favorable for observation, and they have to be capable of following every movement of the guns. Their entire equipment is auto-

mobile transported, and consists of special four-wheel drive trucks, on the platform of which there is fitted an auxiliary gasoline engine and winch for controlling the height and movements of the balloon.

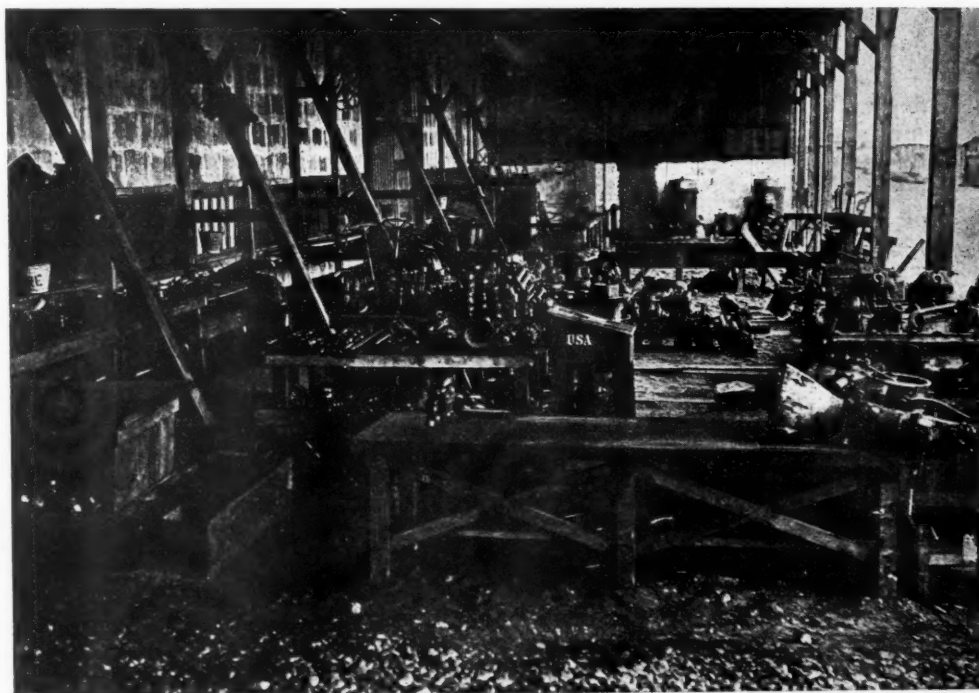
These trucks, with power transmitted to all four wheels, are capable of traveling over any kind of country and taking up any position that the artillery may designate as necessary for carrying out effective observations. In addition to these, there are special balloon tenders, also capable of traveling over any kind of country, and made use of specifically for carrying supplies to the winch-trucks and the balloons. Next in line are more standard types of trucks for carrying the stores and baggage.

At the time of the armistice there had been got together equipment to furnish 50 balloon companies and keep them in operation for four months. About 75 per cent of this material had been supplied by the French and 25 per cent came from America. Because of shipping difficulties the French had been appealed to for winch-trucks and had furnished 50 special Latil trucks, fitted with the Cachot power winch, as used by the French army. In addition to these a large number of special 4-ton trucks had been turned over by the French to the balloon companies at a time when shipment of similar material could not be obtained from America.

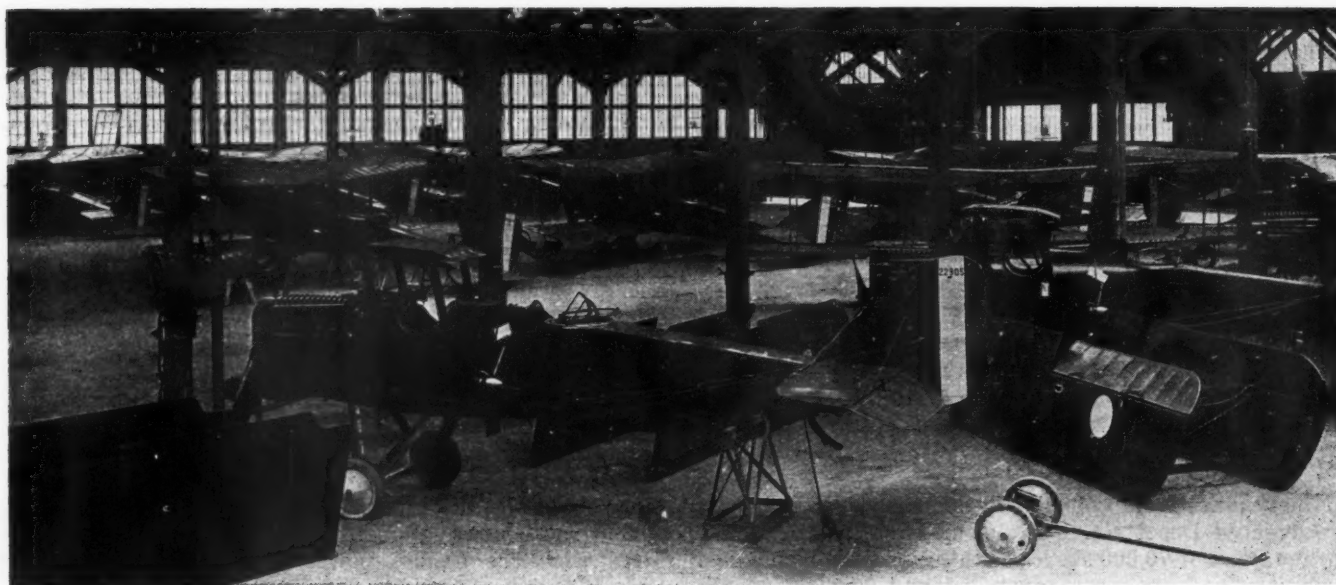
Balloon Companies Had Separate Supply Depot

Because of the special nature of its requirements, the balloon companies had their own main supply depot, independently of the airplane service. It was one of the accidents of war that this depot should have been erected by Germans and used as a factory by the Continental Tire Company, of Hanover, until August, 1914. The German personnel escaped before the storm broke, the French took possession of the factory, enlarged it, and on America coming into the fight turned it over to the Air Service as a balloon depot. Before the fighting stopped this one-time German factory had become the biggest hydrogen gas producing center in the world, with an output of 500,000 cu. ft. per day. During the active period this depot sent out 1650 tons of special balloon material.

It is one of the features of the Air Service that while regular work is going forward, something new is always in preparation. The biggest scheme that the American Air Service was working on as a surprise for the Boche was the organization of night bombardment groups. Had the war continued a few weeks longer these machines would have been in commission and making nightly trips over the German lines with deadly effect. The planes were of the Handley-Page type, built in America, but sent to the Handley-Page factory in England for equipment. On Nov. 11 most of the parts were in hand for about a dozen planes, and the remainder were following up at a rapid rate. These planes, formed into squadrons of 10, would have been flown from England to the field at Orly.



Air service automobile repair and salvage shops at Romorantin



DH-4 airplanes in the assembly shops at Romorantin on the day of the armistice

where they would have received their equipment and picked up their automobile transportation sent out from Romorantin. Supplied with this, the squadrons would have flown to the depot at Vinets, and then proceeded to the special airdromes already prepared for them at various points along the front.

Providing Automobile Equipment

No air force can operate for a single day without automobile transportation. Even in the preliminary stage, which consists of securing supplies, clearing the ground and erecting buildings, the first request made is for trucks and passenger cars. When the preliminary mission came over to map out the ground, in the early summer of 1917, its first requisition, if there had been anybody to receive a requisition, would have been for automobiles. But the French supplied the need in both machines and drivers until the service had grown so much that it was intimated other arrangements should be made. There were plenty of automobiles in America, but the trouble then, as for a long time afterward, was in getting them through the ports and across the Atlantic. Automobiles being required too urgently to admit of delay, and Italy being in a position to make immediate deliveries, an officer was sent to that country with instructions to bring machines back with him by road, which order was carried out in less than a week.

The Air Service had the foresight to see that in the scramble for shipping space the delivery of automobiles from America would be unsatisfactory for a long time, and that some of the special types of vehicles which had never been produced in the United States would be unavailable for many months. In consequence the wise decision was taken to secure available European material, most of it supplied by Italy, at the beginning of the movement. It followed, as a result of this policy, that when the really active period began in the spring of 1918 the Air Service was the only section of the American Army adequately provided with automobile transportation. This material had been selected on the experience of the French and British armies in France, and consisted in addition to the ordinary touring cars and motorcycles, common to the entire army, of special light and heavy aviation trucks, trailers, machine shop trucks, etc.

When the work was at the height of its prosperity, a general order was issued calling for the pooling of all automobile transportation. Under this order the Air

Service had to be sacrificed for the benefit of the American Expeditionary Forces as a whole. Those in authority, also, seemed to be of the opinion that the Air Service should not be mobile and that it did not require more than a fraction of the material provided for in the tables of organization. The Air Service consequently turned over about 2000 new and unused vehicles, and from that time on became dependent on the Motor Transport Corps for its transportation.

In this great task of supplying the American Air Service in France there were employed 3000 officers and 20,000 enlisted men. In the Paris district alone, including Orly, there were 7000 officers and men. There was never a single moment when the job was easy, and there were times when it was so difficult and complicated as to discourage all but the stoutest. In the Supply Section they had a motto, "It can't be done, but here it is," and probably nothing could better describe the general attitude and conditions of the organization.

The Men Who Did It

The men who did effective work on this big job are many. Right at the beginning Colonel Bolling came out with a few experts to pave the way. Active results did not immediately follow. The death of the Colonel early in 1918 was one of the many tragedies of the war. While on a visit to the British Front, Colonel Bolling was surprised by the advancing Germans and his automobile put out of commission by machine gun fire. Taking refuge in a shell hole, in company with his chauffeur, he determined to make a stand, although the only weapon the two men possessed was a service revolver. The end of this unequal fight was that Colonel Bolling was left dead on the field and his chauffeur led captive into Germany.

From near the end of 1917 to early 1918 General Foulois, one of the most experienced aviators in the Service, was Chief of Air Service in France, until he took charge of Air Service operations at the Front, when he was afterward succeeded by Brigadier General William Mitchell. In the spring of 1918, with Germany seriously threatening and the Allies calling on America to make a mighty effort, it became apparent that the American Air Service could only meet the call by close co-operation with the French.

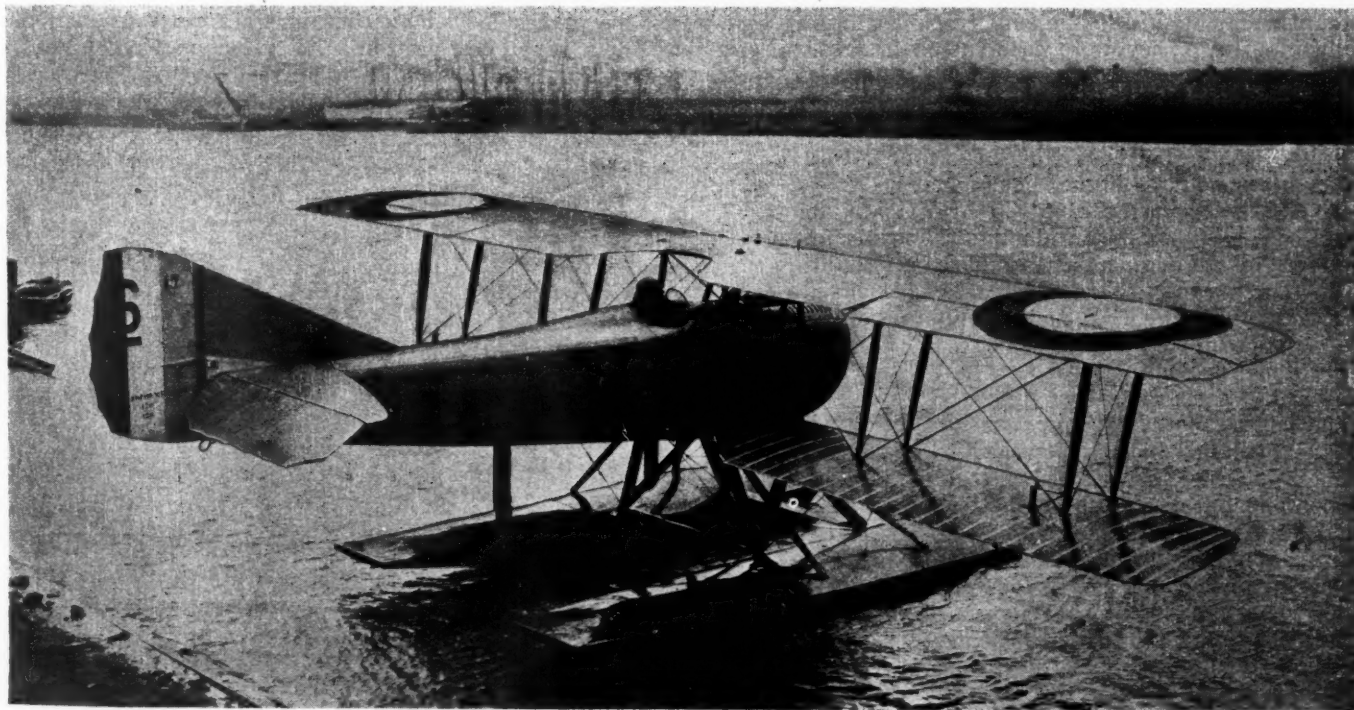
Major-General Patrick, who conducted operations as Chief of Air Service in France until the close of opera-

tions, was made Chief of Air Service upon the relief of General Foulois in early 1918. Colonel Halsey Dunwoody was assigned to duty in April, 1918, by General Foulois, then Chief of Air Service, to organize the Air Service Supply and to negotiate with the foreign governments in order to obtain material to create the Air Service and maintain it until the necessary material should have come from America.

Colonel Dunwoody assumed this duty before the Air Service Supply Section began its operations and held the position from that time until the termination of the war. He was responsible to General Foulois and later to General Patrick, not only for negotiations and supply proper, but also for production, maintenance, transportation, salvage and the operations of all depots, also the big centers of Romorantin, Orly and the ports organizations.



Spad hydroairplane in flight



Spad hydroairplane constructed in France. It is interesting in that it is virtually one of the famous Spad fighting planes mounted on pontoons. Note the short span, the absence of wing tip floats and the large aileron surfaces in upper wing only. The control rods for the aileron are carried inside the lower wing and operate the surfaces through a bell crank and rod at the back of the outer rear strut. The engine is a 200-hp. Hispano-Suiza

It is difficult to give adequate appreciation of the magnitude of this work. It must be borne in mind that the conception, the building and the maintenance had to go hand in hand throughout the period of the great effort against Germany. It was only by resolutely attacking and overcoming all obstacles that this giant business enterprise was perfected until it was in a position to meet the material program of the Air Service needs in France.

New Flying Speed Indicator

THE anemotachometer is a new important instrument for aircraft, for measuring the actual or relative speed of the flying machine. It is made in the form of a cross, each arm of which carries a cup-shaped impeller which the wind drives. The rotation of the wind-driven impeller on its central spindle actuates a pendulum movement, the strokes of which are transmitted to the indicating dial. One of the greatest advantages of this instrument is that its action is always positive and is not affected by the density of the air through which the aeroplane is passing and, further, that the anemotachometer comes into action immediately the machine starts.

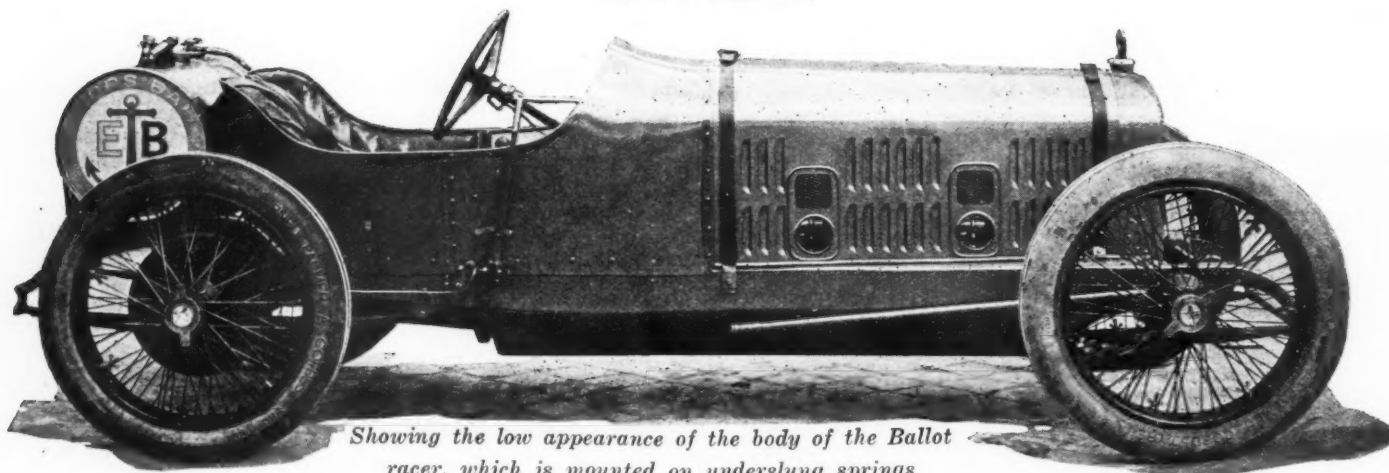
As this instrument has to be near the driver's seat, in large flying machines the same four-cup cruciform anemotachometer is used, but in this case the control is electrical and the flying speed is given by the voltmeter above the pilot's seat. This instrument has a second valuable use in that from it the pilot can judge the curvature of his course. Owing to the number of motors which are now included in the design of one airplane, steering has become very difficult, and it is often impossible for the pilot to know in foggy weather whether he is steering in a curve or straight forward. If two anemotachometers electrically connected to a central voltmeter are placed toward the extremity of each wing of the airplane, then the indications of both instruments will be the same if the machine is flying straight, but if flying in a curve the instrument on the inner or shorter radius of the curve will register a slower speed than the one on the outer radius. From the difference between these indicated speeds, the curvature can be seen from a properly prepared chart on the indicator dial.

Ballot Racing Cars

Built for Indianapolis Track Conditions

Designed and Produced in 102 Days—Eight-Cylinder Vertical Engine with Built-Up Ball-Bearing Crankshaft—Large Wheels and Low Body

By W. F. Bradley



Showing the low appearance of the body of the Ballot racer, which is mounted on underslung springs

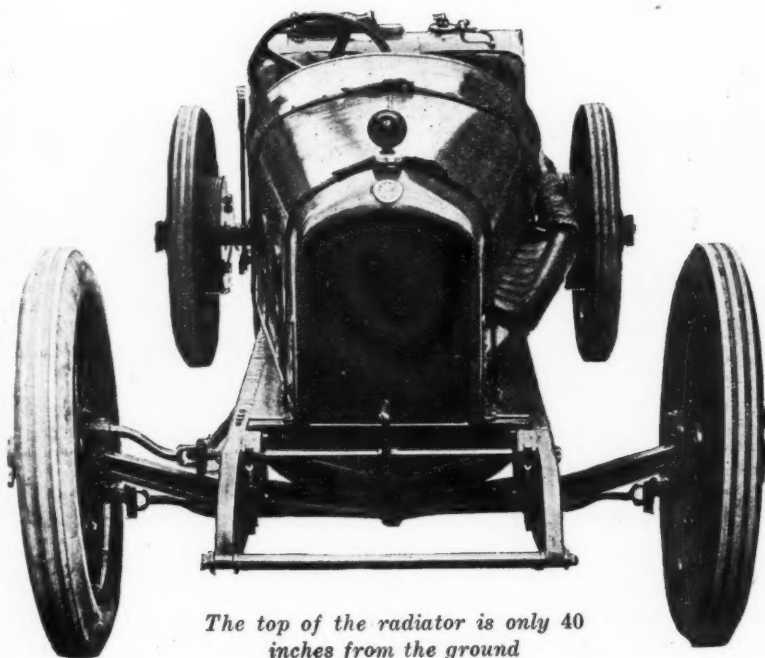
PARIS, April 24—The four special Ballot cars entered for the Indianapolis race are absolutely new productions, built in Paris entirely at the Ballot establishment with Indianapolis track conditions especially in view. They were constructed in record-breaking time, being designed and produced in 102 days.

They have eight vertical cylinders in line, consisting of two castings of four. The bore and stroke is 74 x 140 mm. (2.9 by 5.5 in.). There are four valves per cylinder mounted in the head and operated by means of two camshafts driven by a train of gears contained within an aluminum housing at the front of the engine. The crankshaft is built up in four parts and is carried in ball bearings. I-section connecting rods and aluminum pistons are employed. The engines have a single plug per cylinder and only one magneto. There are two Claudel carbureters per engine.

The engine, clutch and gearbox are mounted on a subframe which is attached to the main frame by three-point suspension, so that there is no possible misalignment no matter how much the main frame members are twisted. There are four speeds and reverse. Drive is taken through the springs, which are of the semi-elliptic underslung type. The front springs are also underslung. The rear axle is full floating type, composed of two forged axle tubes and a central aluminum housing. The center of gravity of these cars is exceptionally low. With 880 x 120 mm. wheels and tires (practically 34 in.) the top of the radiator is only 40 in. from the ground. No special attempt has been made at streamlining and the cars will be run without a tail.

While exact figures regarding speed are not available for publication, it may be stated that these cars are the fastest 300 cu. in. mounts ever produced in France. They will be particularly dangerous in track work by reason of their rapid acceleration. All previous French cars sent to Indianapolis have been road racing machines built for the long straightaway stretches of French roads.

When the Ballot Company undertook the construction



The top of the radiator is only 40 inches from the ground

of these machines it was guided by the experience of René Thomas, who decided that Indianapolis called for a very low center of gravity, good balance and suspension to reduce tire wear, and exceptionally rapid pick-up. The wheel diameters are the biggest ever used on the Indianapolis track, and the cars are the lowest ever seen in America. The final gear ratio has been laid out with the nature of the track in view. There appears to be no doubt that these cars will be able to tackle the four turns per lap at a much higher speed than any of the others, and it is believed that their powerful pick-up on coming out of the turns will give them an exceptionally high speed on the two straight stretches.

Designed and Produced in 102 Days

The building of these four cars constitutes a record in the history of the automobile industry of France, if not of the world. Immediately after the armistice was signed, the writer approached the leading European automobile manufacturers with a view to securing their participation in the Indianapolis race. Some of these firms had decided to race after the war; two of them had cars built; one had an engine partly completed, and one had drawings well in hand. After due consideration, all these firms decided that in view of the very unsettled state of the industry it was a material impossibility to build racing cars between Nov. 11, 1918, and

Details of BALLOT RACING CARS

No. of cylinders.....	Eight
Arr'g't of cylinders.....	In line
Bore and stroke.....	2.9 x 5.5 in.
Crankshaft....	Four-piece, ball bearing
Valves.....	Four per cyl.
Camshafts	Two overhead
Ignition	Single, magneto
Carbureters	Two Claudel
Gearbox.....	4-speed and reverse
Springs	Underslung semi-elliptic
Wheels.....	880 x 120 mm.

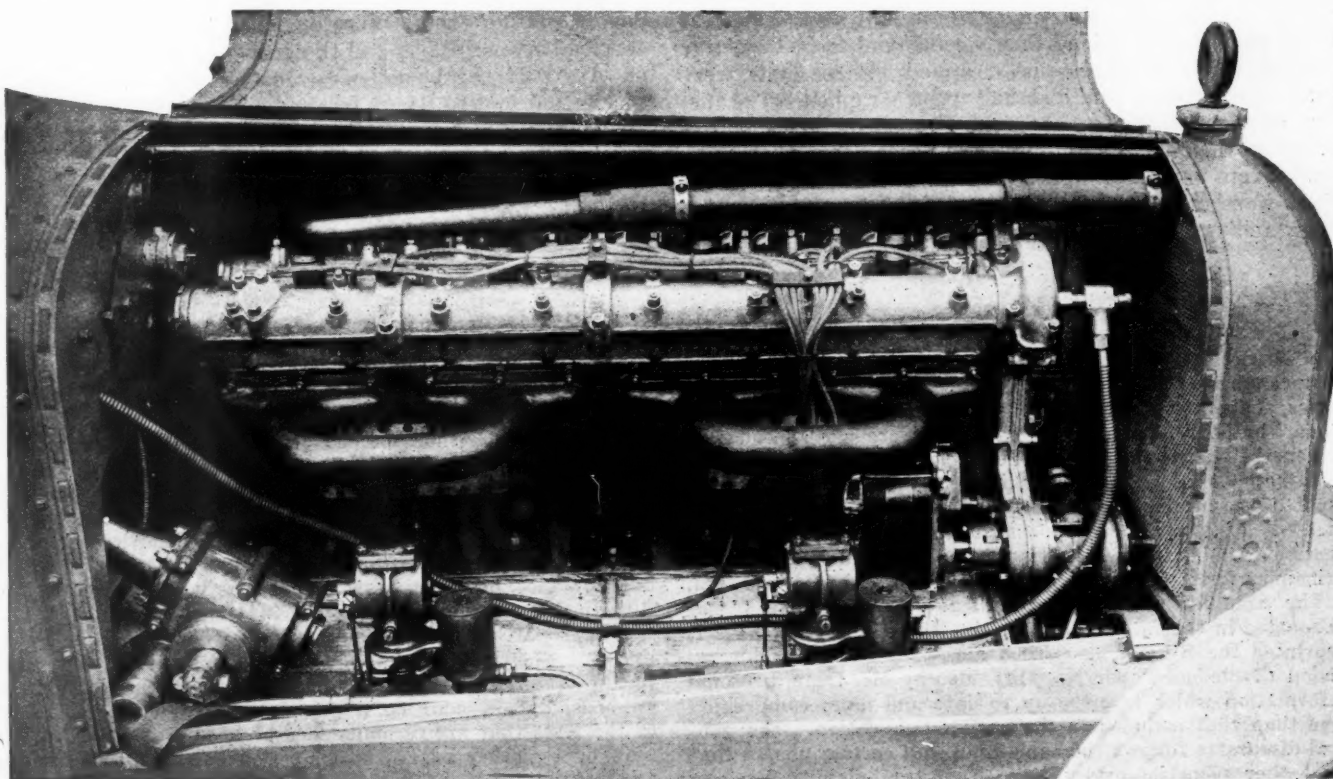
the end of April, 1919, the date on which shipment would have to be made for Indianapolis. In fact, the French makers signed an agreement among themselves not to participate in racing during 1919.

After the attempt to get special cars out of the European factories had failed, the subject was brought before the Ballot Company, one of the largest firms in France specializing in automobile engines. On the morning of Dec. 24 Mr. Ballot announced that he would build a set of cars for Indianapolis, and on the evening of the same day a contract had been signed

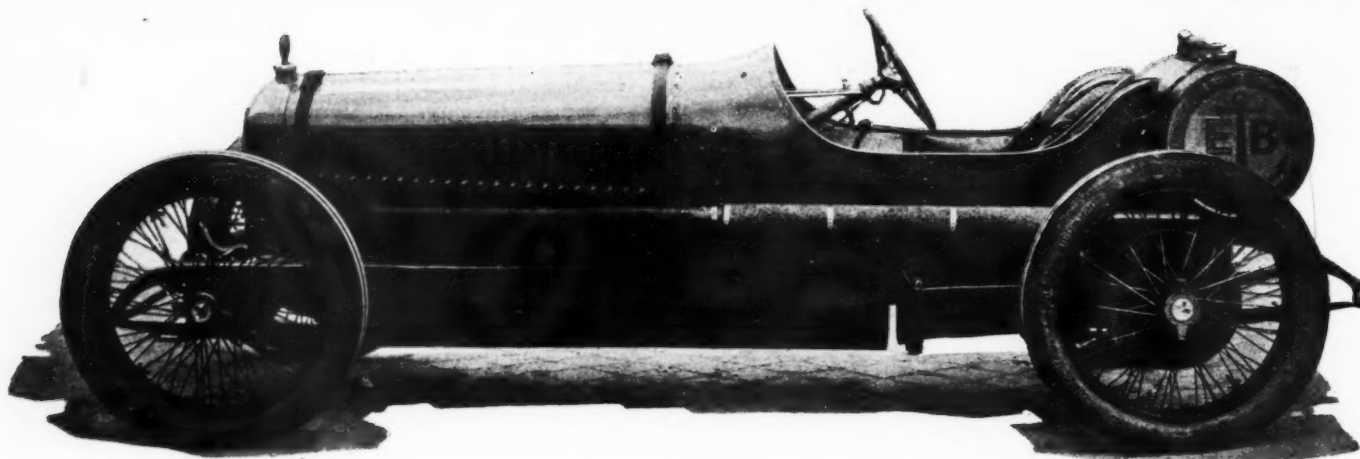
between Ballot and René Thomas whereby the latter entered the company as head of the racing team.

In order to reach Indianapolis on time it was necessary to ship the cars from Paris not later than April 26. This meant that there were 120 clear days, including Sundays and holidays, in which to design, build, assemble, test and pack a set of special racing cars. No set of racing cars had ever previously been built in France in less than twelve months, and even this time was considered short. It must be remembered that although the fighting was over, a state of war existed in France, labor was scarce, material hard to procure, and transportation in an impossible condition.

To secure secrecy, it was decided that the drawing office should be far removed from the Ballot factory. Dec. 25 and 26 were spent in looking for an establishment. It was discovered 12 miles from the Ballot factory in a house



The engine used on the Ballot racing car has its eight cylinders arranged in line in two blocks of four. It is equipped with two Claudel carbureters and a single magneto. Two overhead camshafts operate the valves



One of the four Ballot racers entered for Indianapolis

and courtyard which had been abandoned by a German firm on the outbreak of the war.

On Dec. 26 Mr. Ballot called in one of his best engineers and three of his most skilled draftsmen and informed them that he wished them to disappear immediately from both home and factory and to remain absent for two months. The same day these men loaded drawing office equipment, a stove, bedding, coal, and gasoline aboard a closed truck and went off to an unknown destination. On Dec. 27 the first work was done in the secret drawing office of the Ballot racing establishment. Before making this change the men had been working full time; during the first month each draftsman nearly tripled his working hours. No man left the building except to take meals.

The first real difficulties were experienced when crankshafts were ordered. The first five, forged by one of the best firms in France, could only be delivered by sending an automobile specially on a 300-mile journey. After being partially machined they were found to be defective and the whole five had to be scrapped. Three more were ordered elsewhere, and also had to be scrapped. The disorganization was so great in the French factories, consequent on the change from a war to peace basis, that parts made from bar steel supposed to have the same specifications were found to vary 100 per cent. At this time the work fell behind the close schedule which had been laid

out and the advisability of abandoning the scheme was considered.

Finally it was decided that the Ballot Company should forge and heat-treat its own shafts, and in view of the difficulties which had been met, a test piece was taken from every individual bar, and every bolt and nut which went into the car was subjected to the Brinell test.

On April 7 the first Ballot racing car was run in the yard, after the workmen had left. It had been designed and produced in 102 days, including Sundays. Although everything had been built in the Ballot shops, with the exception of carbureters, magnetos and wheels, the secret had been so well guarded that nobody outside the racing department knew what was going on. On April 11 the first car was approved by the French Government inspector, and on the following day René Thomas went on the road for five days' test.

Shipping space was secured aboard the French liner Savoie, sailing from Havre on April 26, but the railroad service between Paris and the port was so unreliable that on April 24 the boxed cars were loaded on automobile trucks and sent to Havre by road. To provide against any possibility of a breakdown at the last moment, a reserve truck followed behind with a couple of skilled mechanics in attendance. Arrangements were made whereby, on reaching New York, the cars should be unloaded from the steamer and carried to Indianapolis as personal baggage.

Testing Motor Gasoline

IN May, 1917, the Bureau of Mines, Department of the Interior, issued Technical Paper 166, "Motor Gasoline Properties, Laboratory Methods of Testing, Practical Specifications," by E. W. Dean. This paper was prepared because of a general desire for information relative to the properties and methods of analyzing gasoline. The Bureau of Mines studied the problem and prepared a paper discussing the methods of production and essential properties of gasoline, describing laboratory methods of analysis and outlining the principles upon which gasoline specifications should be based.

The first edition of this technical paper (No. 166) was exhausted in the fall of 1918, and instead of merely having it reprinted the Bureau has issued a revised edition. This revision (Technical Paper No. 214), also by Mr. Dean, presents information which is more up to date and more comprehensive than that included in the earlier publication. The general discussion follows the same lines, but certain phases that no longer seem important have been treated with less detail, and considerable additional information obtained during the last two years has been added. The recommendations made in the earlier publication regarding analytical methods and systems of specifications have been changed only in a

few minor details, but the method of presentation has been changed in order to make the information more usable.

Technical Paper No. 214 includes a general description of the properties, methods of production and methods of testing gasoline. The practical interpretation of results of tests is discussed in some detail. The problem of writing specifications for gasoline is treated and specific recommendations are made regarding the limitations which are believed to be important. Figures specifying any particular grade of gasoline have not, however, been included, as it is believed by the Bureau that no single general specification is desirable.

The properties and methods used for the analysis of gasoline are described in detail. Chief emphasis is laid upon the tests of greatest importance, such as the distillation analysis, but in addition a description is included of most of the tests that are recommended or used either by the Bureau or by other organizations. Convenient forms for recording the results of analysis of gasoline are shown and the table is included for transforming Centigrade temperatures into Fahrenheit equivalents.

Copies of this publication may be obtained by addressing the Director of the Bureau of Mines, Washington, D. C.

Tractor Hitch Problem Fundamentally Mathematical

Simple Laws of Dynamics Apply—Most Hitch Problems Can Be Worked Out Graphically

THE tractor hitch problem is readily capable of mathematical analysis. Many of the matters which have been debated from all sorts of angles are clearly open to geometric proof or can readily be solved by graphic statics. While, in general, it is always best to get away from the purely mathematical and to bring home in other ways the advantages and disadvantages of certain types of design, the matter of relation of the tractor to its load through the medium of the drawbar connection cannot logically be discussed in any other way.

The propelling force of the tractor, the weight of the tractor, the character and form of the load or trailer, whether it be plow, road drag, or any other form of load, and the other fundamental factors are all measurable quantities which determine the effect that the hitch has upon the tractor and the implement.

This being the case, a purely mathematical analysis of the matter is well worth while. E. A. White of the University of Illinois has gone into the matter from this standpoint and the following is a digest and re-arrangement of the facts presented by him in a recent paper.

It is a well-known principle of mechanics that one force or one force and a couple may be found which will produce the same effect as a number of forces. In addition to this due consideration must be given to Newton's Third Law, viz., "Action and reaction are equal and opposite." A proper application of these universally accepted laws together with other well-known principles of statics furnishes the keys to a thorough understanding of equalizers and hitches and will clarify many problems which, on the surface, appear to be complicated and perplexing.

As the first general case, take the conditions which are represented in Fig. 1. The load moves in the direction $a b$ and the prime-mover in the direction $c d$. The hitch is attached to the load at the point b and to the prime-mover at the point c , in such a manner that the drawbar takes the direction $b c$. The line $a b$ is parallel to the line $c d$, both of which are parallel to the x -axis. Let the tension in the drawbar $b c$ be represented by F , and designate the angles which this drawbar makes with the x - y - and z -axis respectively as α , β and γ . The force from the load acts upon the motor in the direction $c b$, and can be resolved as follows:

$$\begin{aligned} F_x &= F \cos \alpha \\ F_y &= F \cos \beta \\ F_z &= F \cos \gamma \end{aligned}$$

If a tractor is used force F_x will tend to pull the rear end of the prime-mover to the right and swing the front end to the left. Force F_y will produce a downward pull upon the tractor. The exact manner in which this affects the operation of the tractor will depend upon where the point of attachment c is placed with reference to the wheels. The force F_z is the effective force acting opposite to the direction of motion.

The effects produced upon the load are equal in magnitude

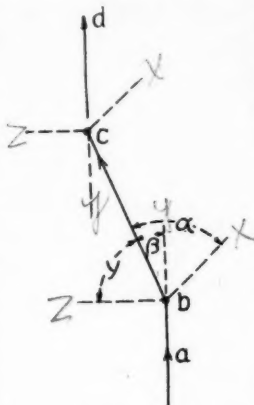


Fig 1

and opposite in direction to those produced upon the prime-mover. F_z is the only force which is effective in the direction of motion and is therefore the only force which should be taken into consideration when computing the drawbar horsepower required to move the load. Suppose that this unit moves at the rate of n feet per minute, then

$$Hp. = \frac{F \cos \gamma \cdot n}{33,000}$$

Very few hitches, however, are as simple as the general case just considered.

In general (eliminating a few patent hitches seldom used) tractor-plow hitches are of two classes, differing essentially in the range of adjustments permitted at the plow.

In Fig. 2 a hitch is represented which allows a very wide range of horizontal adjustment in addition to a vertical adjustment. The hitch illustrated in Fig. 3 has a very desirable vertical adjustment, but the range of the horizontal adjustment is more limited than in the case of the hitch illustrated in Fig. 2.

These hitches both contain the same fundamental elements—three bars making a rigid triangle with a single point of attachment for the clevis which makes the connection between the hitch and the tractor.

In order to illustrate the method of analyzing these hitches for the purpose of comparison a few typical cases will be considered.

Unfortunately, it is not known whether the forces which resist the motion of a plow can be resolved into a single force and a couple. In either case, however, it is evident that there must be some line in which the resultant of the forces which move the plow should act, in order to give a minimum draft and to produce conditions most favorable from the standpoint of operating the plow.

In this paper the resultant of the forces resisting the movement of the plow will be represented by a single force. Any error which may be involved in this assumption can easily be

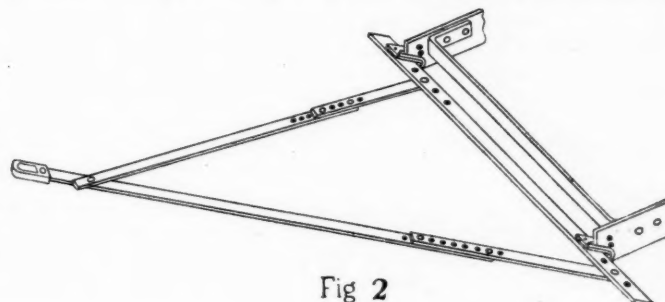


Fig 2

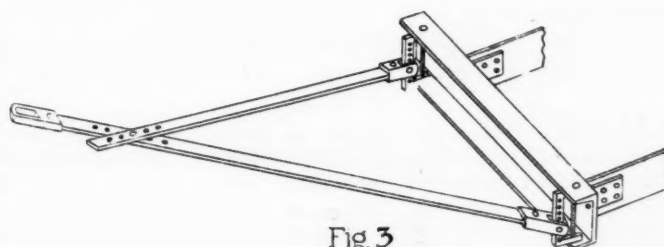


Fig 3

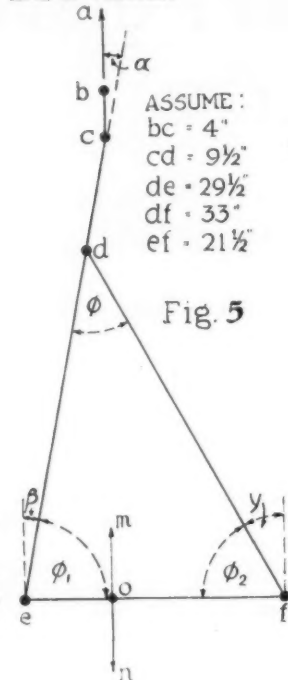
LINE OF MOTION



ASSUME:
bc = 4"
cd = 13"
de = 25½"
df = 32½"
ef = 20½"

Fig. 4

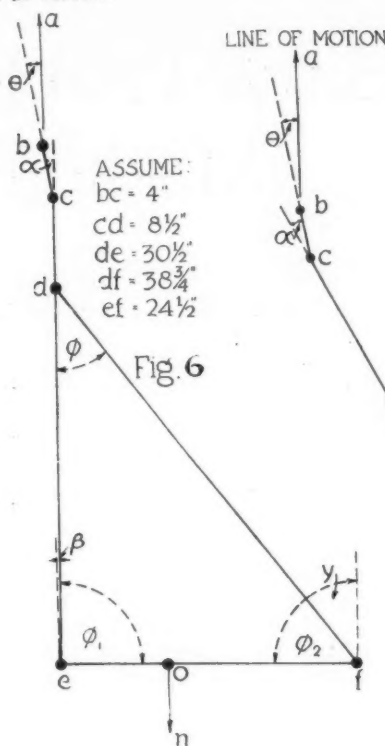
LINE OF MOTION



ASSUME:
bc = 4"
cd = 9½"
de = 29½"
df = 33"
ef = 21½"

Fig. 5

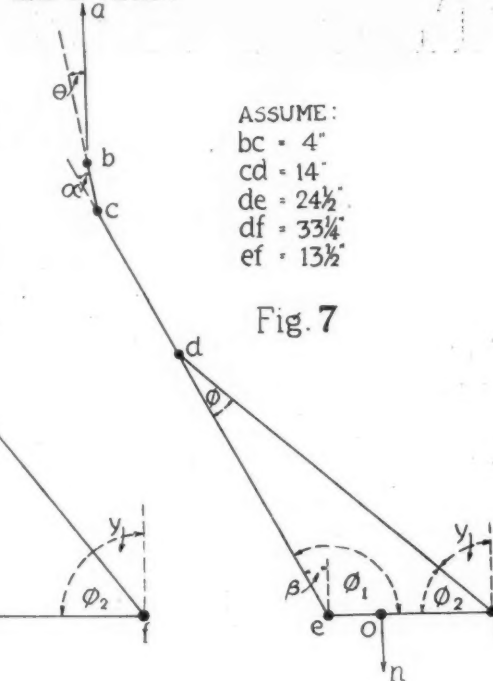
LINE OF MOTION



ASSUME:
bc = 4"
cd = 8½"
de = 30½"
df = 38¾"
ef = 24½"

Fig. 6

LINE OF MOTION



ASSUME:
bc = 4"
cd = 14"
de = 24½"
df = 33¾"
ef = 13½"

Fig. 7

taken account of if later investigations prove it to be incorrect. Further, the effects of the vertical angle of hitch are omitted from the discussion.

In Fig. 4 the adjustments are such that the clevis, $c b$, connecting the hitch and tractor falls in the line of motion of the center of resistances of the plow, $e n$. In this case there is no side-draft on the plow. If the line of motion of the resultant of the forces tending to move the tractor falls in the line $e d$ extended, there will be no side-draft on the tractor.

If, however, this resultant from the forces of the tractor does not fall in the line $b c$ extended there will be a tendency to rotate the tractor equal to the moment of the couple produced. In the hitch the entire load is carried on the member $c e$. The member $d f$ is neither in compression nor tension. It is useful on the turns or when the plow strikes an obstruction which tends to force it out of the line of motion.

In Fig. 5 the member $b c$ is parallel to the line of motion, and falls in the same line $o n$ as that produced by the motion of the center of resistances of the plow. In this case there is no side-draft on the plow. The only problem then is to analyze the strains produced in the members of the hitch. The method here presented is general and therefore will be given in detail.

Let the tension in the clevis $c b$ be F pounds. The tension along $c e$ is

$$F_1 = F \cos \alpha$$

Acting perpendicular to $c e$ is a force.

$$F_2 = F \sin \alpha$$

This force F_2 acts upon $c d e$ as lever and produces tension in $d f$, which will be designated as F_3 . From the law of levers

$$F_3 (39) = F_2 (29.5) \sin \phi$$

$$F_3 = F_2 \frac{39}{29.5} \times \frac{1}{\sin \phi}$$

From this lever there will be a reaction at point e (F_4) taking moments about d :

$$F_4 (9.5) = F_3 (29.5)$$

$$F_4 = F_3 \times \frac{9.5}{29.5}$$

F_4 can be resolved into two forces, F_5 , acting perpendicular to the line of motion and F_6 , acting parallel to the line of motion, but in the opposite direction

$$F_5 = F_4 \cos \beta$$

$$F_6 = F_4 \sin \beta$$

At point e F_6 can be resolved into two forces, F_7 , which acts parallel to the direction of motion, and F_8 , which acts perpendicular to the line of motion.

Similarly at point a the force F_8 can be resolved into two forces, F_9 and F_{10} , which are respectively parallel and perpendicular to the line of motion.

Then it follows that:

$$F_5 + F_6 + F_{11} = F_7$$

$$F_9 + F_{10} + F_{12} = 0$$

If the point of attaching the clevis to the hitch does not fall in the line of motion of the center of resistance of the plow then the conditions illustrated in Fig. 6 may arise when the hitch shown in Fig. 2 is used. Under these conditions the clevis $b c$ will make an angle α with the line of motion.

Let the tension in the clevis be F pounds. At B , the point of attachment to the tractor, this force F can be resolved into two forces, viz., $F_1 = F \cos \alpha$ which opposes motion of the tractor and $F_2 = F \sin \alpha$ which acts perpendicular to the line of motion and tends to rotate the tractor.

In cases of this kind the point of attaching the clevis to the tractor is usually to the right of the line of motion of resultant of the forces which move the tractor.

The moment produced by the force F_2 will act in the opposite direction to the couple tending to rotate the tractor. As a special case these two moments would balance each other. The stresses in the members of the hitch can be analyzed in the same manner as given above for the illustration in Fig. 5.

As the point c does not fall on line $n o$ extended there will be side draft on the plow. The force F_{11} , acting at point c in the direction of motion, is opposed by an equal force applied at o acting in the direction $o n$, which is parallel to the line of motion.

The moment of this couple is F_{11} multiplied by the perpendicular distance from the line $n o$ to the point c , and it will tend to rotate the front end of the plow to the right. Opposed to the action of this couple is the moment of a force F_2 , applied at c acting over a lever arm of unknown length. The increase in draft due to this hitch will be directly proportional to the difference between these two moments.

The conditions represented in Fig. 7 may occur when the hitch represented in Fig. 3 is used. In the ultimate analysis the tendency to produce side draft on the plow and tractor will be the same, but the stresses in the hitch have a very different distribution than in the hitch in Fig. 6.

Counteracting the Propaganda of the Irreconcilables

How Racial Conditions in Our Large Industrial Centers Have Accentuated the Problem—The Effect of an Inadequate Educational System

By Harry Tipper

THE strike which has occurred at the Willys-Overland Company in Toledo brings up again with particular force the division in the labor union ranks and the fight which exists between the labor unions and the radical elements who are taking advantage of the present situation to organize workers in a number of industries and to induce strikes on the basis of their more extravagant promises and more definite position. These radical movements are backed by the irreconcilables in the labor ranks who can see no good in the compromises which have marked the progress of the older and parent unions and who do not want to see any value in such compromises. These irreconcilables are committed to a policy of warfare with the object of direct control. Their

position in respect of both the older and more stabilized unions and the manufacturer are sufficiently indicated by three paragraphs herewith taken from the printed propaganda of the Metal and Machinery Workers' Industrial Union, which is a branch of the I. W. W.

We have noted in these articles from time to time the tendency which exists within the ranks of the labor union for the radicals to gain control under various local conditions which favor that control because of the broad character of the promises and the plausible character of their propaganda.

The unions which are affiliated with the American Federation of Labor find themselves unable to meet or even countenance all the demands which come from dif-

THIS KIND OF PROPAGANDA MUST BE COUNTERACTED

"THE old craft unions can do nothing for us. In the first place, they are controlled by a gang of reactionary politicians whose main object is to hold on to their comfortable, well-paid positions and continue to deliver the workers to the employers like a herd of slaves. They invariably defeat any radical movement among the members. They are able to do this because the A. F. of L. unions are controlled by the officers, not by the members at large."

"WE must have one big union of the workers in each industry, and these unions must be bound together into one mighty organization, which shall reach out to our fellow workers in other countries and unite the workers of the world in one universal brotherhood, with one common aim, the abolition of the capitalist system and all its evils, low wages, long hours, unemployment, industrial slavery and commercial wars. While capitalism lasts, no worker's life is safe."

"FELLOW-WORKERS, the day of the inevitable industrial revolution is near. Signs of the approaching overturn are on every hand. No one can tell when the final break-up will come, but no one will deny that it is coming rapidly. We must not be caught unprepared. The workers must make ready to take over the industries, or our civilization will go down in ruin. "One enemy, one union, must be our watchword."

□ □ □ □

AND THESE WILL COUNTERACT IT

A MERICANIZATION of the mixture of races which provides fertile ground for the promulgation of theories which can be so plausibly presented.

Education which will carry with it enlightenment on economic facts and will offset traditions arising from political backgrounds which facilitate the spreading of such propaganda by those who are familiar with the ideals, the racial instincts and the political history of these races.

Intelligent co-operation with the conservative body of workers who have no desire to see this sort of program succeed and with the more powerful members of the affiliated unions who are as little in sympathy with this program as are the manufacturers.

Time and patience expended by the manufacturer in understanding the worker's position, the worker's point of view and the things which he really desires.

ferent sections of the local bodies and from the different trades. The long experience which they have had in organization work, their continued contact with manufacturers in the settlement of disputes, their knowledge of the responsibility which attaches to the action of the unions have brought some measure of understanding in social obligations so that they are in comparison conservative in their attitude, and their constitutions do not contemplate much more than what they may consider a fair day's work for a fair day's pay. The consequence is that the leaders of these unions have been obliged to discountenance many of the demands of the radical elements in the local unions and in the national bodies. They have been obliged to urge conservatism in the actions of the unions and they have been obliged to recognize the social responsibility which goes with organization power.

These interests have failed to meet the desires and wishes of the radicals and they furnish the groundwork upon which the irreconcilable socialists in the ranks of labor have formulated their propaganda in favor of organizations like the Industrial Workers of the World and in favor of a regrouping of local unions for a larger and broader program of labor demand. The propaganda issued by these irreconcilables is very frank, may be termed brutally frank without overstating the case. It is directed equally against the American Federation affiliations and against the so-called capitalist. It is not only strong propaganda, but it is intelligently written in such a way as to inspire the greatest resentment, to magnify the irritation which may exist in the mind of the worker who is not satisfied with union action and to keep the industrial unrest constantly seething.

Radical Element Took Advantage of War Conditions

Attention is called to it at this time because the detailed reports of occurrences in many industrial cities would indicate that this propaganda is affecting a larger section of the working population than it did before the war and that the indefatigable workers who are behind it are taking advantage of the conditions which have existed during the war and during the armistice period, when the American Federation of Labor has frowned upon excessive demands and strikes, to push this propaganda to the uttermost. The importance of this problem is accentuated by the racial conditions in many of our large industrial centers where the mixture of races provides fertile ground for the promulgation of theories which can be so plausibly presented. Their fundamentally destructive character is not understood by the workman, who is allured by their promises and incited by their denunciations. The Americanization of these races has not yet progressed to the point where they are familiar with the ideals, the machinery and the inherent value of representative organizations. They know little or nothing about economic facts, their traditions arise out of political backgrounds which form excellent soil for such propaganda, and they are worked upon, in almost all cases, by members of their race who are thoroughly familiar with their ideals, their racial instincts and their political history.

The men who are committed to this sort of propaganda, who are committed to control industry and not merely to democratize it, who can see no value in industrial peace under present organizations or modifications of them, but who are engaged in keeping alive the unrest and stimulating it on the theory that warfare must inevitably lead to the control of industry by the workers, these men cannot be reached by any decent organization means. They will not countenance any orderly method of improvement and they are not concerned with organization develop-

ments looking to industrial peace and the preservation of the best elements of the present system, which has lasted a good many years and which has so much of important value. Wherever the local unions or the local workers get into the hands of these irreconcilables and are induced by them to organize for the purpose of their deliberately excessive demands, there is no hope of arriving at a solution until the power of the organizers over the local body of workers is broken. No attempts at adjustment will stave off the trouble where this occurs, and strikes and probable trouble in connection with the strikes must be expected.

Counteracting the Irreconcilables

The conservative body of workers who have no desire to see this sort of program succeed and the more powerful members of the affiliated unions who are as little in sympathy with this program as are the manufacturers, are of importance in combating this propaganda, and careful, co-operative and educational methods will aid very greatly in stabilizing the situation. The large body of the workers who are temporarily misled by the specific promises of such agitators and who are allured by their indefinite pictures of the future, can be reached by the manufacturer if time and patience is expended in understanding the workers' position, the workers' point of view and the things which he really desires.

At no time in the history of developments in the United States has the old Scotch business philosopher's statement been of such importance as it is to-day. The statement that it was vitally necessary for the executive to understand those who were under him while there was no corresponding probability of the converse. It is this necessity in the labor situation which demands a degree of patient consideration and a degree of faithful promotion, by the manufacturer, of all plans prepared for the improvement of the worker's condition and a constant education of all supervisors, so that a confidence may be established which will itself be the most effective means of combating the minority propaganda with its persistent attempts to maintain the industrial unrest.

The other day a manufacturer made the statement that the workers' demands were unreasonable, that they did not seem to appreciate the fact that if their demands were acceded to the business could not continue, and they did not seem to understand or care about the fundamental economic facts. There is no doubt that in a good many of the local strikes which have occurred in the last few months the demands of the local bodies of labor have been excessive and the statements of the leaders of many of these bodies have borne a remarkable resemblance to the propaganda of the I. W. W. and similar irreconcilable radical bodies.

The Influence of Inadequate Education

An examination of the educational work which is done in the schools, a little understanding of the atmosphere by which these men are surrounded, a careful study of the reading which forms a large part of their means of acquiring information indicate that it would be very remarkable if they showed any understanding of the fact that their demands are excessive or any appreciation of the economic fundamentals.

In the public education in the various states of the Union and in the high school education, very little attention has been paid to the proper teaching of the reasons for industrial organization. As it is, in very few cases have manufacturers concerned themselves with the character of the education or the surroundings of their workers, and even where educational processes have been

(Continued on page 1094)

The Webb Law in Operation

Two Views of the Act Permitting Combinations for Export Trade—The Legal and the Business Viewpoints—How Combinations May Be Affected

By Allen Sinsheimer

AS a result of study by legal and business authorities, two distinct views of the Webb-Pomerene law, authorizing combinations of American manufacturers for export trade, have been developed.

One conception foresees legal pitfalls for all combines organized under its authority and predicts that business will find itself mired in a quagmire of trouble, with consequent penalties. This is the view of the lawyers, who naturally note chiefly the legal disasters that may arise from the phraseology.

The other view is optimistic. It foresees the Government co-operating, for the first time, with business, rather than acting the part of the overseeing policeman. This view prophesies that through the Webb law business may promptly develop export trade and compete equally with foreign manufacturers. It pronounces the bill to be the most important step taken to advance and maintain American foreign trade. This is the view of business men who have studied the act and some few lawyers whose perspectives reach beyond the merely legal aspect.

Both views were discussed at the recent Foreign Trade Convention at Chicago, where all the manufacturers present voiced a unanimous approval of the act. More than eighty combines have already been organized, it was stated, and are functioning without difficulty.

As it stands, the Webb-Pomerene act authorizes American manufacturers to organize combinations to engage in foreign business which will not be called illegal under the Sherman act.

The pitfalls pointed out by various lawyers are found in Section 2, which is to the effect that any combination organized under the Webb law will be found guilty of illegal practices if it restrains trade in the United States or restrains the export trade of a domestic competitor or artificially or intentionally increases or decreases the prices of its commodities sold either in foreign or domestic markets.

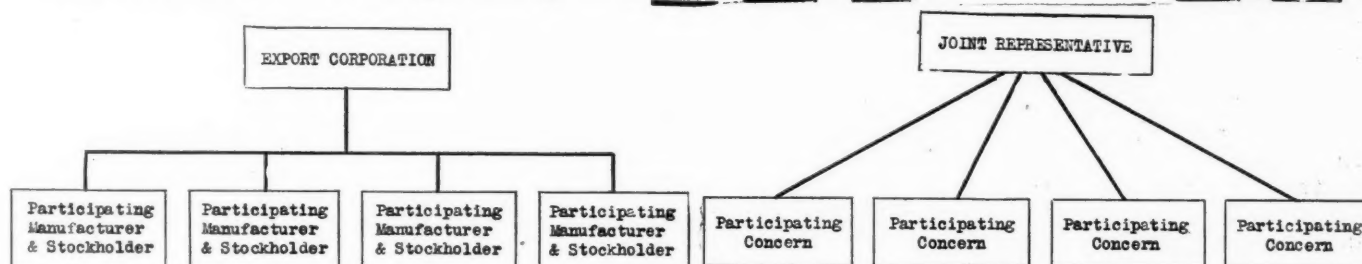
Three Questions Which the Lawyers Ask

Under these legal limitations lawyers find three questions arising:

1. If a combination of American manufacturers exports such quantities of merchandise as to diminish the domestic supply and thus force an increase of domestic prices, will it be enhancing prices in the United States in conflict with the provisions of Section 2?

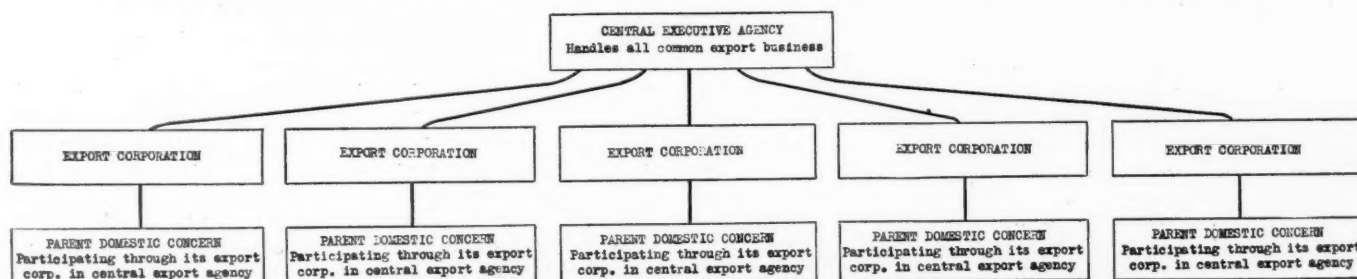
2. If a combination of American manufacturers under-sells another combination of American exporters abroad to the extent that the competitor's business is ruined both abroad and at home, will it be acting in restraint of trade?

Three Methods of Organizing Export Combinations Under the Webb Law



The most commonly used method is the organization of a corporation by a group of manufacturers with the participating concerns as stockholders. The export corporation operates as an independent concern.

Another, and very simple, form of organization is that where the participating concerns form an association by joint agreement through a joint representative who assumes charge of the foreign business.



A third method for organization is by each participating concern organizing a subsidiary export corporation with each of these entering into an agreement for handling all export business through a central agency.

Practically all of the manufacturers and some of the legal advisers, including John Walsh, former chief counsel of the Federal Trade Commission, were inclined to regard these questions as being more or less superficial. They believe that the act, which in itself for the first time in legislative history does not provide a penalty for the first violation, but merely a recommendation by the Federal Trade Commission to violators, was intended by Congress to be purely an aid to American business and not an obstacle. The possible pitfalls caused by the legal limitations will be accepted, it is thought, by the Federal Trade Commission in a broad light, and no attempt will be made to prosecute concerns unless they practice dishonest or positively unfair methods. In other words, it will be the policy of the Government, according to the manufacturers' viewpoint, to co-operate with American business throughout, and manufacturers may combine under the provisions of the act and plan to engage in foreign business without fear of any Government interference, provided they engage in honest business.

May Undersell Competitors

Question No. 1 was disposed of by the general acceptance of the belief that manufacturers who would meet and pledge certain quantities of their supplies for export once each year prior to the beginning of the year's campaign could in this way display their honest intentions and be able to overcome any legal questions that might arise even if the domestic supply were thus diminished and domestic prices increased as a result.

American combinations organized under the act may undersell their American competitors abroad regardless of the provisions of Section 2 if they can prove that their methods of production and operation of business warrant their sales at lesser prices. In other words, in answer to Question No. 2, they may undersell if they do it by fair and honest methods.

Question No. 3 was answered by statements that American manufacturers might sell a commodity abroad for less than the domestic prices without enhancing domestic prices if the foreign prices were reduced to meet foreign competition. If, however, prices are reduced only in certain localities abroad merely to meet American competition or without justification, this, it was thought, would be regarded as an enhancement of domestic prices.

It is unfortunate that the provision in Section 2 was drawn in its present manner, for it creates a situation whereby the Sherman law is suspended in behalf of American exporters yet at the same time is held over the exporter as a club in the event of violation. It can be assumed, however, that the Government will not undertake to penalize an export association for openly practicing methods it regards as proper under the law, but it will probably be well for the protection of associations to constantly keep the Commission informed of the practices planned and engaged in.

Act to Be Broadly Interpreted

That a broad view of the act may be expected of the Commission is displayed in its statement that: "It is not reasonable to suppose that Congress meant to obstruct the development of foreign commerce by forbidding the use in export trade of methods of organization which do not operate to the prejudice of the American public, are lawful in the countries where the trade is to be carried on and are necessary if Americans are to meet competitors there on more nearly equal terms."

That the act will allow combinations to engage in many practices not directly export trade but indirectly connected with it was the opinion of Mr. Walsh, who stated: "Although the act strictly defines 'export trade' and ex-

empts from the penalties and restrictions of the Sherman act only 'an association entered into for the sole purpose of engaging in export trade and actually engaged solely in such export trade,' still it must be assumed that the Congress had in mind the fact that under the corporation statutes of the various states and the District of Columbia every corporation is vested automatically with certain incidental powers and that it would be a practical impossibility to form a corporation with no powers other than that of being engaged solely in export trade.

"It is a general rule of law that a corporation possesses not only the powers specifically conferred upon it by its charter but also such as may be fairly implied from those powers, including all that are essential to the declared object of its existence. Therefore, it may be fairly assumed that an export association may among other things establish and maintain agencies and act as agent in foreign trade, acquire, equip and operate wharves, warehouses, elevators, ships, and acquire, dispose of, pledge, mortgage or lease property, real or personal, subject to legal restrictions, and to do many other acts incidental to the business of export trade."

Phraseology of Doubtful Meaning

Other sections of the act also include phraseology and provisions that should have the attention of exporters. Section 1 indicates, for example, by the words "exported from the United States to any foreign nation" that export products must actually be sent to a foreign nation. Again, by the use of the phrase "or selling for consumption or for resale" within the United States, Congress has left opportunity for misunderstanding. It is clear that an export association must not sell for domestic consumption, but it is not clear whether such an association may manufacture for consumption or resale in the United States.

Section 3 allows a corporation to hold or acquire or own any part of the stock of an export corporation which is organized actually to engage in export trade unless the holding or owning of such stock will restrain trade or lessen competition within the United States. This will allow associations to take over the export department of some established manufacturer if they so desire.

Section 4 provides that any exporters who are engaged in unfair practices which interfere with or obstruct free competition, such for example as selling below cost, will be found guilty of illegal methods. This section is a powerful one and can be used to prevent all trickery and fraud.

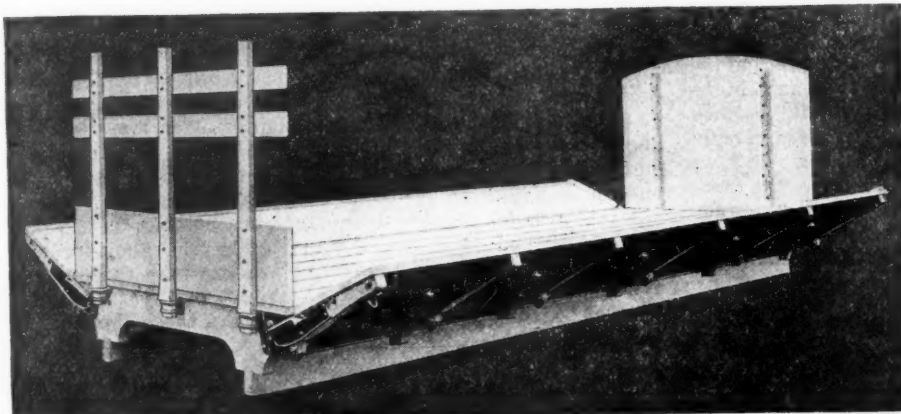
Export Associations Must File Statement of Ownership

Section 5 provides that every association formed to engage solely in export trade must file a statement with the Federal Trade Commission within thirty days after its creation, giving the names of its officers and stockholders, its by-laws, if any, and make like statements each year. The second paragraph of Section 5, which provides that the Federal Trade Commission when it discovers any violations of the act may summon the officers of an association and make recommendations for readjustments, is designed to enable the Government to guide export associations definitely and to avoid the confusion which has resulted in business circles since the passage of the Sherman law.

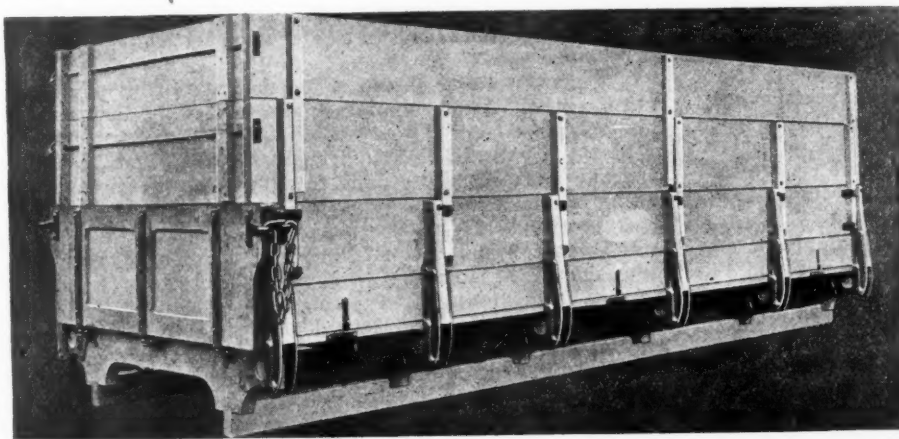
The use of the term "foreign nations" is taken to mean any land except the Hawaiian Islands, Porto Rico, Alaska and the United States proper. The term "commerce" is taken to imply navigation, and consequently grants permission to operate ships for both export and import.

Republic All-Purpose Farm Truck Body

Can Be Quickly Converted for Different Uses
Covering the Whole Range of Farm Haulage

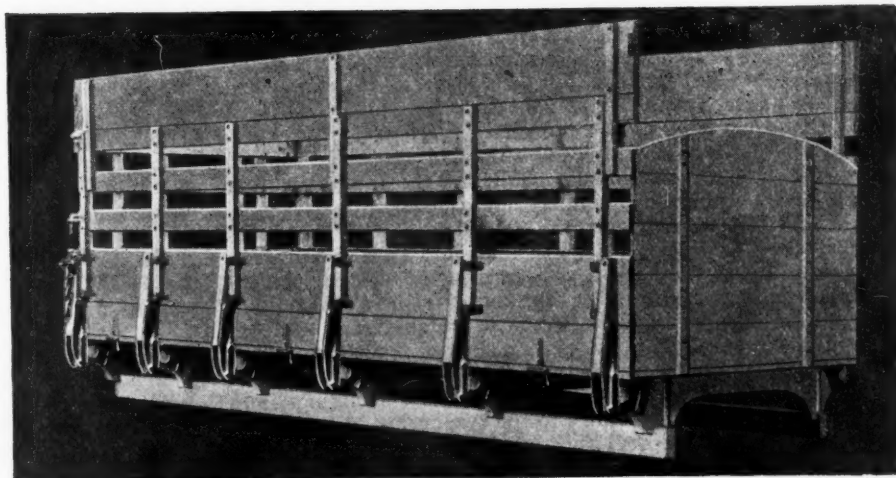


Platform hayrack useful in hauling hay, wheat, oats, cornstalks, etc. By using a different set of supporting stakes we obtain a platform with level extension side boards, head board and end gate, suitable for hay, grain in bags, cement in bags, fertilizer in bags, fruit produce in crates, poultry in crates, farm machinery, dressed meats, fence posts, etc. Entirely removing the extension boards makes a platform type truck with head board and end gate adapted to stone hauling and other heavy duties



Three-section tight removable side box for barnyard fertilizer, cabbage and bulky produce. Removing top side boards makes a combination grain, apple and potato box with two-section tight removable sides. Removing the remaining side boards gives a regulation wagon box with removable sides and end gate arranged for hauling loose materials such as coal, dirt, gravel, grain, etc.

Cattle rack type adapted for hauling cattle and also transporting cotton and similar materials requiring a rack enclosed body. Removing the side boards converts this into a combination stock and basket rack box suitable for hauling hogs and sheep and crated goods



AN all-purpose farm body has been brought out by the Republic Motor Truck Co., Inc., of Alma, Mich., for use with Republic trucks. The body is designed to give the farmer a wider range of use for his truck. Eight types of bodies are combined in one, and so designed that one man can adjust it to any desired type in a few seconds.

The body is made of kiln-dried hardwood lumber and well ironed so as to prevent rattles. It is made in two sizes, known as Nos. 1 and 2. The No. 1 body is 9½ ft. long and is a combination platform and wagon box, as illustrated. The bare body sells for \$115.

No. 2 body is 11½ ft. long and is a combination platform and wagon box, as illustrated, selling for \$135.

The extra side racks to convert the body into grain, fruit and cattle type are \$33 on the No. 1 size and \$36 on No. 2. The weight of the No. 1 body, combination platform and wagon box only is 500 lb., and of No. 2 600 lb. All the paint work on these jobs is standard green with light green stripes.

Some of the different types of bodies are illustrated and the purposes for which they are intended are outlined.

This is apparently one of the first attempts to solve the truck-body problem from the standpoint of the use of motor trucks on the farm. Loads of such wide variety have to be transported in this service that convertible bodies are really essential.



The F O R V M



Liquid Fuel Injector

By Henry B. Higgins, Jr.

THE primary object of the device shown in the drawings is to simplify the "direct-injection" type of oil engine so that its use becomes practicable in the relatively small, high-speed units employed in trucks, tractors and similar service where operating conditions are often severe and good care is seldom available.

The most efficient means yet devised to insure the perfect combustion of fuel oils consists in spraying them direct into the combustion chamber by means of a jet of compressed air as the piston begins its working stroke. This charge may be ignited as it enters the chamber by means of an electric spark, hot surface, or the heat of the suddenly compressed injection air, or by the Diesel method.

The advantages of this type of engine over those operating on the Otto cycle, employing atmospheric carbureters, mixers, etc., together with various heating arrangements, are well recognized. Following are some of them:

They start readily on their regular fuel without priming, preheating or other preliminaries (except where hot surface ignition is used).

They are flexible in operation and not particularly sensitive to atmospheric variations.

Thorough combustion of the fuel is secured, practically eliminating smoky exhaust, fouled cylinders and valves, and the serious troubles incident to dilution of the lubricant by unburned fuel.

As no fuel is present in the working cylinders until used, preignition is impossible, eliminating the need of water injection.

Combustion is not explosive; hence high compression may be used without excessive pressures ensuing, making for good fuel economy without excessively heavy construction.

It follows that they are longer lived and more economical, both of fuel and lubricating oil, generally using from 0.4 to 0.7 lb. of fuel per brake-horsepower hour.

In addition to economical operation, higher volumetric efficiency is possible, due to the induction of cold air and the absence of throttling or wire-drawing action of the atmospheric carbureter (necessary to provide sufficient air velocity to break up the fuel) upon the incoming air.

The principal factor which has confined these advantages to comparatively large engines has been the expensive, complex and rather bulky apparatus necessary for the supply of injection air. This usually consists of a two- or three-stage compressor, air cooler, receiver and high-pressure piping and connections, besides the admission valve to the atomizer.

Attempts have been made to avoid these by the use of the "solid-injection" system, wherein no air is used, fuel being sprayed into the cylinder by a high-pressure pump and atomizer under a pressure of 2500-3000 lb. per square inch; but so far they have not been entirely successful, partly owing to troubles with the high pressure fuel pump and connections and partly to the inferior quality of the spray entailing higher fuel consumption and dirty operation.

The device shown avoids the complications of the usual compressed-air system, while retaining its desirable features, to which it adds another—that regardless of whether the engine is being cranked over or running at full speed the quantity and pressure of the injection blast are absolutely uniform and a good spray can be depended upon, without undue wastage of high-pressure air, under all conditions.

It is applicable to either two- or four-cycle engines, and overcomes the usual objections to the two-cycle—backfiring in the base and loss of fuel through the exhaust ports while charging, thus increasing the usefulness of this simple and durable engine.

In effect, the system under discussion is a two-stage compressor, the compression in the working cylinder not only supplanting the first stage but also acting upon a small differential piston to further compress a small portion of itself for fuel injection. Except for a cam and rocker arm, or their equivalent, to time this operation by giving the small piston a slight initial lift off its seat, a check valve and the piston itself, which is practically frictionless except for the packing rings requiring little or no lubrication or attention, the device has no moving parts, and this slight added complication is more than offset by the elimination of the troublesome carbureter and ignition system.

While a small plunger pump for each cylinder is the most reliable method of measuring and supplying fuel for each atomizer, some form of gravity or low-pressure feed may be utilized, as it does not have to encounter any pressure. Any form of "open-type" atomizer may be used, those shown being among the simplest.

Figs. 1 and 2 show the injector applied to a two-cycle engine igniting by high compression and will serve to illustrate its operation.

In Fig. 1 it is ready to operate. Working piston *A* is nearing the top of its stroke and cam *K* is on the point of depressing the end of rocker arm *J*. The space above compressor piston *C* is filling with air at cylinder pressure, through valve *N*.

It should here be noted that the bottom face of compressor piston *C* is divided into two parts by the seat *D*. One portion, *E*, communicates with atmosphere through vent *H*. The other, *F*, is open to cylinder pressure. However, the area of the top face, *G*, of piston *C* is a little greater than that of *F*, therefore piston *C* is held tighter upon its seat as the pressure increases.

In Fig. 2 working piston *A* reached its firing point and cam *K* slightly lifted compressor piston *C*. The instant that this took place, vent *H* was cut off and the entire bottom face of piston *C* exposed to cylinder pressure, which caused this piston to move rapidly up and forcibly eject the air above it through atomizer *M*, spraying the oil contained therein into working cylinder *B*. A small space is left between passage *L* and the end of compressor cylinder *I*, in order to provide an air cushion for piston *C*.

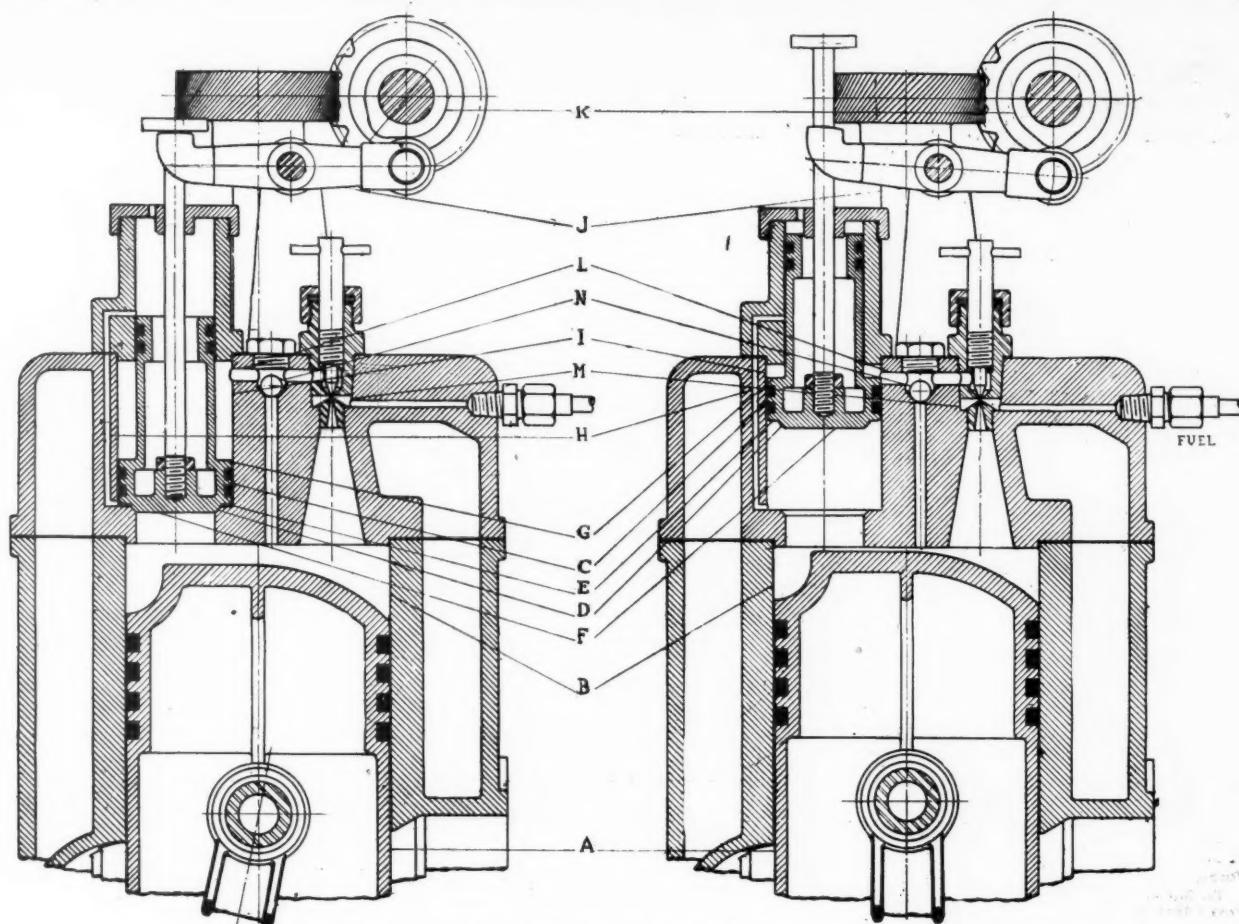
If the device is designed to compress to 350 lb. per square inch or more, the heat of the suddenly compressed air will be sufficient to ignite ordinary fuel oil before it leaves the atomizer, blowing it into the combustion chamber in the form of a flame. If it is desired to use lower compression, ignition may be effected by a spark plug or hot surface placed in its path.

The slight partial vacuum in the working cylinder during the charging period of the cycle (either two- or four-stroke) should be sufficient to return compressor piston *C* to its seat, or a light spring may be used if faster action is desired.

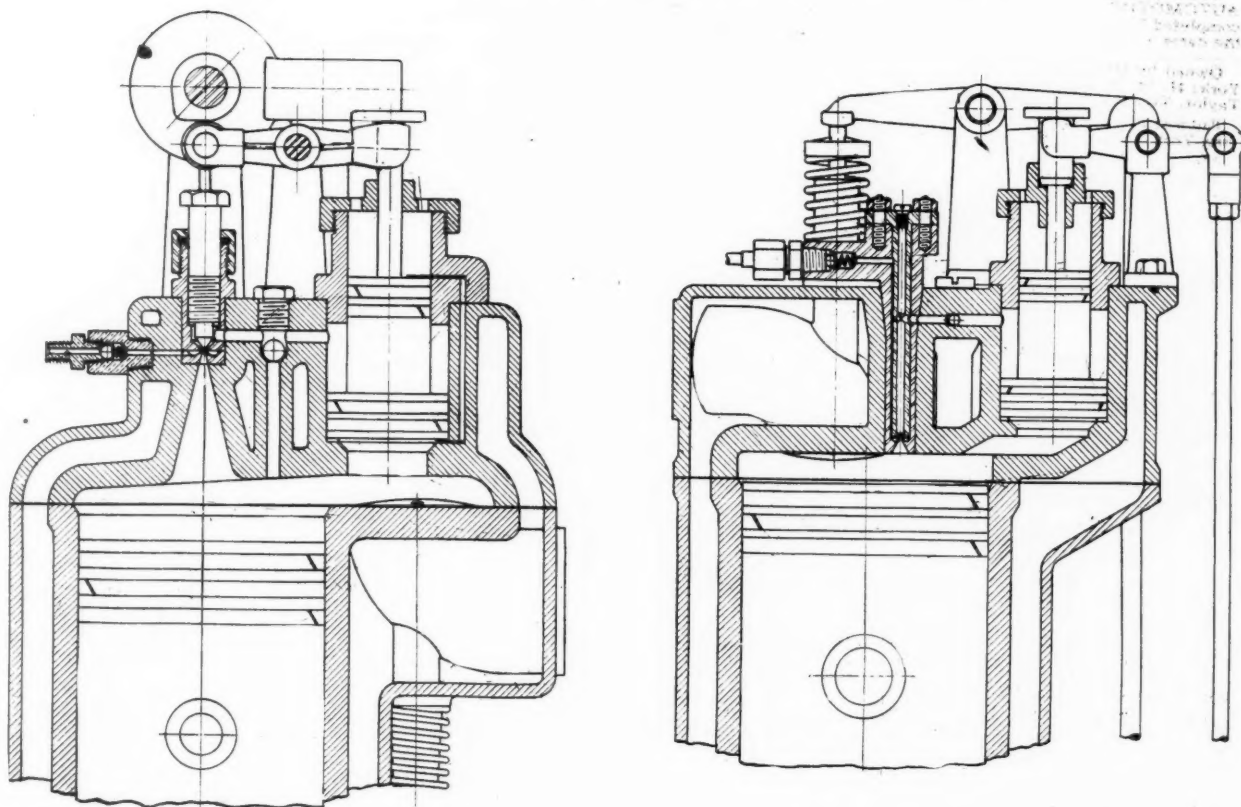
Fig. 3 shows a possible application of the injector to a four-cycle L-head motor, and Fig. 4 shows it in connection with a valve-in-head type.

A minor improvement is also shown in Fig. 4. A portion of the lift rod for compressor piston *C*, just below its head, is enlarged, this enlarged portion fitting into a counterbore in the upper head of compressor cylinder *H*, as the piston nears the bottom of its return stroke. The compression of air in the pocket thus formed serves to cushion the piston and prevent its unduly pounding upon seat *D*.

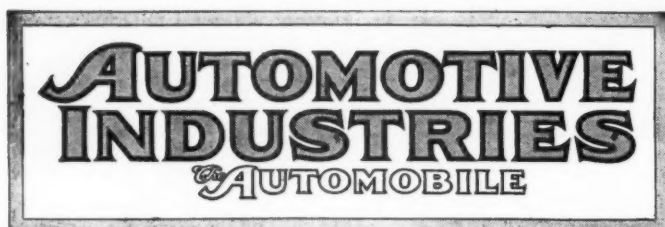
In conclusion, the drawings only show the principle of the device. Its various details may be arranged to conform to almost any type or size of engine. It is cheap to manufacture, and for most engines would involve no great changes in design. It involves no new and untried theories, but is merely an adaptation of the already successful large stationary and marine oil engines to the smaller units of the automotive field.



Figs. 1 and 2—Higgins liquid fuel injector applied to two-stroke engine



Figs. 3 and 4—Application of Higgins liquid fuel injector to four-stroke L-head and valve-in-head engines



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Webb Act Will Aid Export Business

LESS legal advice and more sound business judgment should be the guide to exporters who consider forming combinations under the Webb Act.

The engineer believes that all the success of the automobile business lies in design. The production manager thinks it is all in manufacture. The sales manager will tell you it is entirely a matter of sales policy. And similarly the lawyer sees only the legal technicalities in the Webb Act.

He notes only how you may entangle yourself with the law and not how the law may help you to untangle export trade. He finds only the pitfalls in which combines may be caught and overlooks the sound government support by which industry can escape the pitfalls in foreign business.

The Webb Act is stated in its title to be specifically an act for the promotion of foreign trade. It was definitely intended as such by Congress and any

attempt to use it for the entanglement of business would be a perversion.

That the legal authorities are wrong seems evident in the verdict of the Federal Trade Commission, which also finds it a law for the benefit of industry and not intended as a club over it.

It is a safe and sound opinion that American manufacturers may combine under the authority of the Act and develop a vast export trade regardless of the legal possibilities of the law so long as they conduct a fair and honest business.

The Aerial Convention

IT is obvious that the aircraft industry needs effective propaganda at the present time. Under Government nursing it has grown to large size in a few years, and now that Government support has been practically withdrawn, the industry has to stand on its own legs, as it were, which will be a difficult experiment at first.

All other branches of the automotive industry were successfully promoted by competitions and exhibitions in their earlier years, and there is no reason to doubt that the same method should be successful when applied to the airplane industry. The aircraft convention, exposition and contest being held this month at Atlantic City is a parallel to the "Nice weeks" of former years. Nice occupies much the same position as a shore resort in Europe that Atlantic City does in America. At Nice the automobile, the motor boat and the airplane have successively had their innings, and efforts were made there specially to promote the sale of the more expensive and luxurious cars, boats, etc.

Atlantic City has not figured very prominently in motor sports so far. There can be no question, however, that it is a suitable place for spreading the gospel of aerial transport. During the month there will probably be several hundred thousand visitors at the resort from all parts of the country, as well as some from foreign countries. These will largely represent the wealth and the business interests of the country, and if a favorable impression can be made with these classes, a very good beginning will have been made toward popularizing the airplane.

The program which is being carried through consists mainly of illustrated talks on different phases of aircraft work. Among the possible applications of aircraft covered in these talks are forest patrol, police service, mail service, overland and overseas transport and exploration. There will be talks on the medical, legal and insurance phases of aerial travel. Numerous are the contests for which prizes are offered, and with the exception of the prize for the transatlantic flight from Atlantic City, all are likely to be won during the month, as the conditions attached to them do not appear at all difficult in view of the progress made in airplane construction.

There is also scheduled for the end of the convention a series of engineering sessions. It is very likely, however, that the lectures and discussions (if any) will be of a popular character, though dealing with the engineering phases of the airplane.

Legislative Meddling with the Fuel Problem

CALIFORNIA legislators recently took it upon themselves to solve the motor fuel problem by law and in about a week's time introduced no less than three bills embodying proposed standard specifications for gasoline, in the State Legislature. Happily this legislation was smothered, but inasmuch as it is very likely that other states will venture similar legislative action in the future, it may not be amiss to show the futility of the thing.

It is true enough that purchasers of motor fuel are experiencing certain difficulties with the product sold them. Gasoline is not what it was ten or fifteen years back. But we have long become reconciled to the changing quality of gasoline and have endeavored to adapt our engines to it. It is not a matter of human perversity but of immutable natural laws. The amount of petroleum which can be pumped from the earth is limited; in fact, according to figures given out by representatives of the Fuel Administration, the whole unmined supply will last only for about a score of years. The demand for gasoline is increasing faster than that for any other petroleum products, and to meet it the oil companies have found it necessary to increase this supply by every known means, such as including heavier fractions and rendering the fuel usable in engines by blending with casing-head gasoline, converting kerosene or gas oil into gasoline by the cracking process, etc.

The Law of Supply and Demand

How the law of supply and demand is asserting itself in this connection was well brought out in a recent lecture by a representative of the Bureau of Mines, who said that the cost of processing was substantially the same for kerosene and gasoline; that the only reason gasoline sold at about twice the price of kerosene was that the demand for gasoline was relatively much stronger.

This inexorable law of supply and demand will continue to assert itself, and if we wish to have all the fuel we will need for the rapidly growing number of gasoline engines we will be obliged to use heavier and heavier fuels in spite of whatever legislation we may pass. If we stipulate that gasoline must not show lower than 60 deg. Baumé at 60 deg. Fahr., then most of us will soon have to burn something called by a different name—and the change in name will not help us in our carburetion difficulties.

The problem of standard specifications was taken up some years ago and we thought that the subject had been definitely laid aside, the conclusion having been reached that such a standard would have to be continually modified and therefore would be of no practical value. If a specification should be adopted that called for a really high-grade gasoline the result would be that, owing to scarcity of the available supply, the price of such a fuel would soon rise beyond all reason, and every garage would be compelled to sell another grade of fuel, at a price

within the reach of the average consumer. It is self-evident that, with the more volatile fractions removed, this motor fuel would be less volatile and less burnable than what we now burn as gasoline. If we have understood the Bureau of Mines correctly, it has maintained the standpoint that the solution of the fuel problem lies in using straight-run fuel; that is, a blend of all the fractions of crude petroleum which can be successfully burned in modern engines. If legislation like that proposed in California should be adopted widely throughout the country the effect would be just the opposite. The class of automobile owners to whom money is no object, who as a rule own the latest models that are best adapted to burn the heavier or poorer grades of fuel, would buy the high-grade fluid, and leave the man in moderate circumstances, with his superannuated machine with weak fuel-digestive organs, to get along as best he may with the poor stuff. Instead of remedying that fuel situation such legislation would really aggravate it.

Another reason why legislation of the character referred to is objectionable is that when it is taken up by different states and handled in different ways it will lead to confusion. What a burden it would be to the petroleum refiners if they had to produce and store gasoline of different grade for each State! Also, the engine manufacturer could hardly be expected to turn out different classes of engines to suit the "legal fuels" in different states. The lot of the engine manufacturer and the engine user would certainly be the easiest if one uniform grade of fuel were sold throughout the country—the best that the proportion of demand to supply would allow. And sectional legislation of the character proposed in California, instead of furthering this end, would defeat it.

America's Lead in the Motor Industry

EUROPEAN automobile manufacturers are not unmindful of the fact that from the beginning of the war, when all passenger car manufacture for private account stopped with them, for a period of four years the American industry continued to improve its designs, and as a result has achieved a substantial lead in motor car construction. Some have sent representatives to this country to study our latest practice, while in one or two instances American designing talent has been engaged abroad to introduce our methods.

Previous to the war European and especially Continental manufacturers looked upon the American chassis with scorn. It was said, for instance, that it would never satisfy the artistic taste of the French purchaser. Possibly at the present time in France the exigencies of commercial life are a stronger factor than the artistic instinct. At any rate, American achievement in the automobile line is no longer deprecated and literature on our methods of design and production is in demand abroad.

□ Latest News of the

Saxon Reorganization Plan for Formation of New Company Perfected

**New Corporation Will Be Financed by New York and Chicago Bankers
—Digest of Plan—Creditors to Receive Stock for
Value of Claims Against Present Company**

DETROIT, May 13—The Saxon Motor Car Corp. refinancing plan continues to make steady progress. Matters directly connected with the securing of additional capital necessary to put the company on its feet have not been completed by the creditors' advisory committee as yet, but will follow when all details connected with the proposed reorganization are effected. All of the bankers and the majority of the merchandising creditors have approved of the plan which calls for the formation of a new company to be capitalized for \$6,450,000, the liquidation of all present stock, and the assuming of all liabilities by the new organization. The creditors are to receive stock for the value of their claims against the present company. The present stockholders are to be given stock in the new company according to the present plan.

Since June, 1917, the affairs of the Saxon corporation have been conducted by an advisory committee of creditors, consisting of: Chairman, William J. Gray, vice-president of the First & Old Detroit National Bank, Detroit; Ralph Van Vechten, vice-president, Continental & Commercial National Bank, Chicago; C. R. Talbot, vice-president, National Bank of Commerce, Detroit; C. W. Dickerson, treasurer, Timken-Detroit Axle Co., Detroit; W. R. Angell, secretary, Continental Motors Corp., Detroit; W. S. Thomas, vice-president and treasurer, Wagner Electric Co., St. Louis.

Has Paid Off 30 Per Cent

This committee has kept the company solvent through the application of a general liquidation policy and the extension of outstanding notes. Every 6 months the books are balanced, 10 per cent payment on obligations made, and the paper renewed. The company is now on its fourth 6-month period and has paid off 30 per cent of the original indebtedness with 6 per cent interest. The company's standing indebtedness to date is now approximately \$2,450,000.

The new company is to be refinanced by New York and Chicago brokers, who have tentatively agreed to underwrite the stock. This matter, however, has not been formally settled inasmuch as the committee in control has had its hands full since the first of the year in, first,

obtaining a 6-months time extension on outstanding obligations, and, second, in securing the consent of each individual creditor to the proposed reorganization plan. With the exception of a few minor creditors the indorsement of all has been approved, and the next step will be the taking up of the financing project with the brokerage firms.

A digest of the reorganization plan of the Saxon Motor Car Corp. is as follows:

The advisory committee of creditors who have been in charge of Saxon Motor Car Corp. affairs since June, 1917, will cause a new company to be organized to be called The Saxon Corp., and to acquire the title to the assets of the present company through application of claims of the depositing creditors. It is contemplated to organize with the following capitalization:

\$2,000,000 in principal amount, 6 per cent gold bonds;

\$1,250,000 issue of 8 per cent cumulative preferred stock;

\$3,200,000 common stock, \$100 par value, each.

War Conditions Affected Reorganization

The committee states that under war conditions previously existing it was impossible to interest capital in the enterprise, and that it is now apparent that a complete reorganization must take place. Efforts to induce the stockholders to work out some plan of reorganizing have failed. The enforced policy of gradual liquidation has reached its limit, and unless new capital is immediately secured to carry on the business, manufacturing activities must cease.

The present indebtedness of the corporation is approximately \$2,400,000. The assets at book value exceed this indebtedness by \$250,000, but in event of enforced liquidation the assets would bring but a fraction of the book value.

Creditors Will Take Stock

Under the plan, the present creditors will take stock equivalent to the value of their claim. Responsible bankers are ready to furnish capital by the purchase of bonds and preferred stock if the creditors take stock in payment of claims. The underwriters propose to manage the reorganized company for a period of

from 3 to 5 years. If it is found impossible to transfer the assets of the present company to a new corporation, then the advisory committee, in the opinion of the creditors, should take steps to sell the assets of the company.

Common stock in the reorganized company will be deposited with trustees for a period of 3 years. This stock will be evidenced by the trust certificates, to be issued by the trustees, to be delivered to creditors as stockholders in the new company, but a continuing option will be given the banker to purchase within 3 years shares of the par value figures of \$2,400,000, plus annual interest at 6 per cent.

Willys-Overland Strike Now a Matter of Principle

TOLEDO, May 14 (*Special Telegram*)—Watchful waiting is the policy adopted by both Willys-Overland Co. and their idle employees. The situation remains unchanged. Both sides refuse to give in an inch, but nevertheless an air of expectancy prevails. Toledo is full of rumors that an agreement is near. Since Saturday morning daily conferences between the workers and the company have been held, but an agreement seems far away.

Though the strike was called as a result of a controversy over hours, it has gradually taken the aspect as to whether or not Toledo will remain an open or closed shop town. The Merchants and Manufacturers Association has indorsed the Willys-Overland stand and brought down upon its head the wrath of unionized labor. The whole affair has developed into a matter of principle, not of hours, and the radical element predicts a general walk-out unless the cause of the strikers is victorious.

On the other hand, it is said the manufacturers are prepared to suspend all operations if serious difficulties develop. Both sides are leaving no stones unturned in their efforts to prolong the struggle.

Willys-Overland stockholders held their annual meeting Tuesday, and endorsed the stand of the company in handling the strike. A general assessment of 50 cents a day has been levied on all union men in Toledo. The boilermakers and iron shipbuilders have voted to stand by the Willys-Overland strikers, and other unions will take the same action, it is said.

In a statement to-day the Electric Auto Light Co. says it is prepared to operate its plant 48 hours a week if the majority of the workers approve such a schedule. This company is a subsidiary company of the Willys-Overland.

Automotive Industries □

At the annual stockholders' meeting the Willys-Overland Co. elected the following directors: John N. Willys, C. A. Earl, James E. Kepperly, Edwin B. Jackson, C. O. Miniger, Royal Scott, F. K. Dolbeer, Edw. F. Swift and Rathbun Fuller.

Spacke to Produce Low Priced Car

INDIANAPOLIS, May 13—The Spacke Machine & Tool Co. will begin producing within the next four weeks a car which will be sold for \$295. It will be known as the Spacke and its builders claim that it will go between 40 and 50 miles on a gallon of gasoline. The company expects to be able to turn out 30 of these cars a day, and if present plans are carried out over 10,000 will be produced during the coming year.

The car is a roadster, seating two persons, and is equipped with the Spacke 9-13 De Luxe twin cylinder air cooled engine. Fully equipped, the car will weigh about 700 pounds. It will have a wheelbase of 90 in. It will use tires 28x3 in., and will have demountable wire wheels. The seats will be of the bucket type, the body of pressed steel. Atwater-Kent ignition will be used with hand control on the dash.

The car is equipped with two speeds forward and one reverse in a planetary system. Camshaft drive with helical gears is fitted on the machine and the lubrication is of the eccentric pump and splash type. The gasoline feed of the car is gravity with a foot accelerator. The body will be painted a battleship gray.

The manufacture of the car will be confined to the present factory and a new assembly plant, while Factory No. 2 will continue to produce car axles.

General Motors Issues \$50,000,000 Stock

PONTIAC, May 14—General Motors Corp. has issued \$50,000,000 additional cumulative 6 per cent debenture stock to provide increased working capital. This brings the total outstanding up to \$85,315,000. The amount authorized is \$150,000,000.

Capt. Lepere President of the Franco American Engineering Co.

DETROIT, May 15—Capt. Georges Lepere, who came to this country in 1917 as chief engineer of the French aviation mission to America, is remaining as president of the Franco-American Engineering Co. here. Capt. Lepere is the designer of the Lepere fighting plane. The company is doing consulting engineering work on cars and engines as well as airplanes.

8-Hour Day Voted by French Parliament for All Industries

Involves No Wage Reduction but Increased Production—Agreement Already in Effect in Some Factories—General Satisfaction with Scheme

PARIS, April 26—The 8-hr. day voted by the French Parliament will affect the entire automobile industry of France. The engineering trades of France, however, had not waited for the Government decree before reducing the number of working hours to 8 per day.

Early in March the men's unions approached the French Union of Metal Industries and Mines with a view to the adoption of the 8-hr. day. The manufacturers declared their willingness to meet the representative of the workers, and although considerable difficulties had to be overcome a satisfactory agreement was arrived at for the entire metal industries of France, including mechanical construction, naval engineering, and electrical work. The men's delegates signed the agreement on behalf of 200,000 workers. Even among the socialistic element it is recognized that the manufacturers displayed a broad and generous spirit throughout the negotiations.

Production to Be Speeded Up

In the agreement between masters and men, it is recognized that there shall be a general speeding up by the adoption of more modern methods of shop practice, so that the output shall be the same under the 8-hr. day as under the old system. At the same time it is clearly understood that the reduction in the number of working hours shall not be accompanied by any reduction in wages. When men are paid by the hour there will be an increase in the rate, so that the same weekly salary can be earned.

The agreement went into effect 2 or 3 weeks before the law was passed. But even before this agreement, some of the automobile factories had adopted the 8-hr. day. One of the first to make this change was M. Laurent Seguin, head of the Rhone & Gnome Aviation & Automobile Co. Mr. Seguin was convinced that the 10-hr. day, 60-hr.-per-week system, in general use in France, was not economical. The men began work at 7 a. m. and left at 7 p. m. after having spent 2 hours over a heavy lunch. In winter work had to be done by artificial light at each end of the day, whilst 2 of the brightest hours of the day were spent in eating, or in going to and from the factory and home.

There was inefficiency at the beginning

of the day, for the hour immediately following lunch, and during the last hour of the day. It was proposed that the men should work for 8 consecutive hours, with the exception of a break of one-half hour to take a light meal on the premises. This half hour is paid. The men now start work at 7.30 and quit at 3.30. Since this scheme was adopted by Rhone & Gnome it has been taken up by the Rolland-Pilain Automobile Co., at Tours.

This experiment is being watched with considerable interest. Officially it will not go into effect before June 1, 1919, but in many cases the 8-hr. day will be adopted immediately. In blast furnaces and other establishments where fires have to be kept going continuously, it will be necessary to modify the plant, and on this account the new régime will not be applied until 6 months after the signing of peace preliminaries.

In the agreement between masters and men, as well as in the Government law, provision is made for either 6 days at 8 hours each, or for what is known as the English week, under which the factory is closed on Saturday afternoons, the total working hours for the week not exceeding 48.

International Signals for Aircraft in Distress

LONDON, April 19—In a "Notice to Mariners," the Admiralty announces a provisionally agreed upon international code of distress signals for airplanes. The Board of Trade has also notified owners and masters of shipping. The announcement of the Air Ministry is as follows:

"In order to eliminate unnecessary risks of fatal accidents to aircraft and pilots, signals for aircraft in distress have provisionally been agreed upon by the International Aerial Sub-Committee of the Peace Conference in Paris and will be used in the future.

"The signals, which may be displayed by the aircraft, either together or separately, are as follows:

1. The International Signal "S.O.S." by means of visual or wireless telegraphy.
2. The International Code Signal of Distress indicated by N.C.
3. The Distance Signal, consisting of a square flag having above or below it a ball or anything resembling a ball.
4. The continuous sounding with any sound apparatus.
5. A Signal consisting of a succession of white Very Lights fired at short intervals.

"These signals are subject to such modifications as may be published from time to time."

Tire Prices Going Down

Reduction, Averaging About 15 Per Cent, Attributed to Plentiful Supply of Rubber

NEW YORK, May 12—Tire prices have been quite generally reduced, the average reduction amounting to approximately 15 per cent. Although it was expected that prices would eventually come down, it was not thought that the reduction would be made so soon, and the action has caused some surprise, particularly in view of the fact that late last week tire manufacturers stated that no reduction was looked for until June 1 or later. In fact some went so far as to offer reasons why the revision should be upward instead of downward.

Goodyear started the downward move, and was followed almost immediately by United States, Firestone, Goodrich and practically all of the other large makers. At this time there are very few makers who have not made public new lists with reductions ranging from 10 to 15 per cent, the average being approximately the larger figure.

The present reduction is laid largely to the plentiful supply of rubber, as well as to its low price. Last month a total of 24,000 tons came in as compared with a total of about 7000 tons the same month last year. Shipping is easing up to a noticeable degree and still better conditions are looked for in the immediate future.

The fabric situation is not in an altogether satisfactory condition. Since England placed an embargo on all Egyptian stocks, prices have soared and there is little, if any, available.

It is expected that some Egyptian

stocks may be released soon, and this probably will cause a drop in fabric prices. The general tendency at present is toward a slight reduction. Factories are not buying in any quantities for future deliveries, most of them ordering only what they need and re-ordering as this is used up.

Chemicals, too, have been declining slightly, but against the reduction in costs of chemicals and fabric, there is the present high cost of labor. It is not expected that this will be reduced for some time to come.

Tire prices have remained practically steady for nearly a year. The last general movement was an increase, this being made about April, 1918, when most makers added something like 10 per cent to their lists.

Prior to the present drop, prices had reached what is probably their record height. The average price of a 34 x 4 non-skid casing, considering the products of 10 of the leading manufacturers in all price-class fields, stood at \$40.47.

Assuming that all manufacturers reduce their prices in accordance with the reductions made by the leaders, this average at the present time figures out at \$35.43, which is very close to the average for September, 1917, as shown by the accompanying chart.

Tire prices first started on their upward trend in January, 1916, when most makers added approximately 10 per cent to their lists. A year prior to that, in February, 1915, makers had reduced prices by 10 to 15 per cent. The next rise came in December, 1916, when 15 per cent was tacked on; in April, 1917, another 15 per cent was added; in September, 1917, prices were raised from 5 to 15 per cent, this being the third increase in the year; and in April, 1918, another 10 per cent was added.

Just how long the present prices will hold it is difficult to predict. It is pointed out that crude has reached its lowest point for a number of years.

New Corporation to Take Over Red Head Spark Plugs

NEW YORK, May 10—The Red Head Spark Plug Corp. has been formed with principal sales offices at 261 Broadway, and has taken over the Red Head Spark Plug business formerly operated by the Emil Grossman Corp., Brooklyn, N. Y. The new company has no connection with the old one. It will continue and enlarge the business. An insulating plant has been opened at Newtown, Pa.

27,948 Tons of Rubber Imported in April

Figures Are 14,523 Tons Ahead of Same Month in 1918—Returning to Normal

NEW YORK, May 13—The removal of all government restrictions on the importation of crude rubber into the United States and the improved shipping facilities have combined to bring rubber imports back to normal. Figures for April show importation of 27,948 tons. The slight decrease from the 28,223 tons for March is undoubtedly explained by the irregularity of the shipping schedule at the present time. Figures compiled by the Rubber Association of America showing the importation figures for crude rubber for the past four years follow:

	1916	1917	1918	1919
	Tons	Tons	Tons	Tons
January	9,162	12,788	16,084	7,235
February	1,597	10,162	13,108	14,079
March	10,070	18,624	17,161	28,223
April	10,014	13,000	13,425	27,948

Bulletin on Gasoline Issued by Bureau of Mines

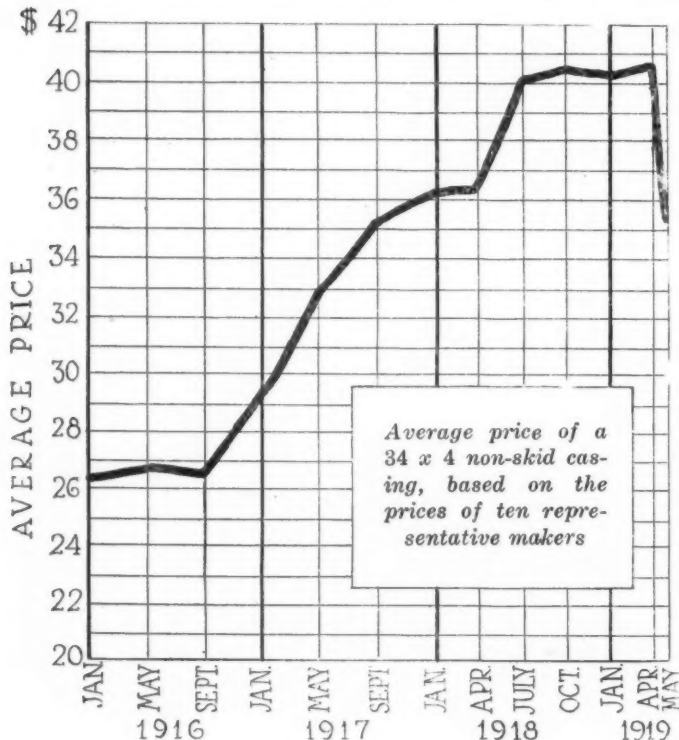
WASHINGTON, May 13—Methods of analyzing and securing information of gasoline properties have been described in detail in a technical paper, Motor Gasoline Properties, Laboratory Methods of Testing, and Practical Specifications, by E. W. Dean, and issued by the Bureau of Mines, Department of the Interior, this week. The paper is an elaboration of an earlier paper on similar subjects.

The revision brings information up to date and includes methods of production, laboratory methods of analysis and outlines the principles upon which gasoline specifications should be based. The problem of writing specifications for gasoline is treated and specific recommendations are made regarding the limitations which are believed to be important. Figures specifying any particular grade of gasoline have not, however, been included, as it is believed by the Bureau that no single general specifications for motor fuel are either practical or desirable.

The properties and methods used for the analysis of gasoline are described in detail. Chief emphasis is laid upon the tests of greatest importance, such as distillation analysis, but in addition a description is included of most of the tests that are recommended or used either by the Bureau or by other organizations. Convenient forms for recording the results of analysis of gasoline are shown and the table is included for transforming Centigrade temperatures into Fahrenheit equivalents.

Wisconsin Axles to Have New Maker

OSHKOSH, May 12—The E. B. Hayes Machinery Corp., maker of Wisconsin axles, has been sold to the Wisconsin Parts Co., a new corporation capitalized



at \$500,000. W. F. Rockwell, formerly vice-president in charge of engineering and production of the Torbensen Axle Co., Cleveland, is president and general manager of the new concern, and Louis Schriber, vice-president of the Old National Bank of Oshkosh, is treasurer. The Wisconsin Parts Co. will continue the manufacture of Wisconsin worm drive axles for trucks from 1- to 5-ton capacity. A tractor axle has also been designed and is in process of manufacture. The present capacity of the factory is 500 axles a month, and additions now being made will soon double the capacity.

Patterson Truck to Come from Los Angeles

DETROIT, May 12—J. Neil Patterson, Los Angeles, Cal., is in Detroit completing plans for the organization of a new company to manufacture trucks and trailers at Los Angeles. He was former president and is now vice-president of the Los Angeles Trailer Co.

The new company will bring out a truck to be known as the Patterson. It will be made of standard parts. It will have many new features to meet western conditions. Eastern as well as western capital is interested. Robert Fry of Detroit, until recently with the engineering department of the Motor Transport Division of the Army, is associated with Mr. Patterson as chief engineer.

Fellows Gear Shaper Extending Plant

SPRINGFIELD, VT., May 11—The Fellows Gear Shaper Co. will make further extensions to its plant, which was enlarged during 1918. A 2-story shop, 144 x 147, of brick and steel, will give an increased manufacturing capacity of 60 per cent. When the additional plant is in full operation, the 450 men now employed will be increased to 750. An office 42 x 102 will also be built. The top floor of the new office building will be occupied by the engineering and drafting departments, and the general offices will be on the second floor. It is estimated that the extension will cost about \$200,000, not including equipment.

Overland Strike Is Still On

Manufacturers Siding with Overland Rousing Organized Labor —Workers Want 44-Hr. Week

TOLEDO, May 13—Rioting late Wednesday and Thursday afternoons at the plant of the Willys-Overland Co. caused Clarence A. Earl, vice-president and general manager, to order the plant closed indefinitely, making approximately 16,000 men idle. In issuing the order, Mr. Earl stated that he was closing the plant as the only way of averting bloodshed.

The Electric Auto-Lite Co. and the Ford Plate Glass Co. are also closed. Although the Willys-Overland Co. and a committee of Overland employees have been holding daily conferences since Saturday, no perceptible progress in adjusting the trouble has been made.

A new and grave crisis is developing which may involve the entire industrial section of Toledo. In a signed statement, published in all the Toledo papers, nearly 100 Toledo manufacturers endorsed the stand of the Willys-Overland Co. This statement has aroused organized labor to a high pitch and talk of a general strike is heard everywhere.

Mayor Schreiber is acting as the point of contact between the strikers and the company. His request that he be permitted to assist in bringing about a settlement was accepted by both parties. More than 7000 workers, at a mass meeting Friday, agreed to appoint a subcommittee to accompany the mayor to the Overland plant.

From the tone of the newspaper articles it is apparent that Toledo is badly split in its opinion as to justifiability of the strike. A big element is endorsing the stand of the company. The only point in question is the matter of hours. The workers are willing to stay on the job 8 hr. and 36 min. daily if they receive overtime for the extra 36 min. The company is steadfast in its determination to operate on a regular schedule of 48

hours a week without the overtime. It is on this point that the whole strike is based.

Governor Cox of Ohio has ordered George F. Miles, chief investigator of the Industrial Commission, to Toledo, to aid in bringing about a settlement. The police department has taken steps to deputize 3000 special officers to keep order in and about the plant.

National Organization for Liberty Highway

SPRINGFIELD, ILL., May 13—At its first annual convention held recently a national organization of the Liberty Highway Association was effected. Stephen Lawless, Liberty, Ill., was elected president and Truman T. Pierson, Quincy, Ill., treasurer and national organizer. Vice-presidents are: R. J. Holmes, Decatur, Ill.; C. A. Hetrick, Asbury Park, N. J.; Joseph T. Daniels, Columbus, O.; George A. Binkert, Quincy, Ill., and W. H. Conkling, Springfield, Ill. The organization has been formed for the purpose of having a hard surfaced highway built across the continent from ocean to ocean.

Dependable Truck to Move to Peoria

GALESBURG, ILL., May 11—The Dependable Truck and Tractor Co. is considering the removal of its plant and headquarters to Peoria. Plans have been completed for a building with 50,000 sq. ft. of floor space. C. W. Morse, who is at the head of the company, was formerly with the Locomobile Co. of America and later with the Pan-American Corp., Decatur, Ill.

Eisemann on Overtime Basis

BROOKLYN, May 14—The steady drift toward normal conditions in the motor industry, following the change of conditions due to the termination of the war, still finds the Eisemann Magneto Co. working full blast, with part overtime. The indications are that in order to maintain its record for prompt deliveries on its large bulk of commercial orders the entire Eisemann plant will be working to its capacity for some time to come.



Inauguration ceremony of Pioneer Wing of Police Reserve Air Service, making New York the first municipality with aerial police force. Two Curtiss JN-4D biplanes with 110-hp. engines were used at inauguration ceremonies. First flight was made to Philadelphia

Cheap Roads Increase Transportation Cost

National Highway Traffic Assn. Hears Practical Problems Discussed at First Annual Meeting

NEW YORK CITY, May 14—Upward of 75 attended the first annual meeting of the National Highway Traffic Association, an organization formed last November for the purpose of working for traffic betterment throughout the country. This organization had its inception several years ago as a local traffic organization for greater New York City. It was soon expanded into a traffic organization for the state of New York. The demands for solution of traffic problems from adjoining states suggested the desirability of making it a national organization and this was successfully carried out. The membership is now over 300.

Development of Rural Express

The subjects considered at yesterday's meeting had to do with the development of rural motor express. F. W. Fenn of the National Automobile Chamber of Commerce gave a complete summary of what has been accomplished throughout the country. J. H. Collins, Highway Transport Committee, Washington, outlined the necessary plans for making surveys for rural motor express routes, and James E. Boyle, professor of rural economy at Cornell University, analyzed the situation in New York state. He showed the fluctuating costs of farm products in different seasons due to lack of flexibility in highway transportation.

H. G. Shirley, secretary of the Federal Highway Council, Washington, referring to the work of the council, reported that it has 400 members and its work has been endorsed by 800 commercial organizations. The national character of the Federal Highway Council's activity is indicated by the fact that 43 state highway departments are now co-operating with the council and 68 different highway officials are represented in the council.

Road Cost

Geo. H. Pride, president of the Heavy Haulage Co., New York, an organization engaged exclusively in motor transportation between cities and in practically any field, declared that heavier loads must be permitted on the highways if cheaper transportation is to be obtained. He says it is possible to make money on inter-city haulage between New York and Boston if you are permitted to carry 7½-ton loads, but is not possible with 3 or 5-ton loads. His views on the problem of road cost are very practical. If expensive highways that will withstand heavy traffic are built the cost of transportation is lowered; but if cheaper highways are built that will not carry heavy traffic, the cost of transportation is increased. It is a case of six of one and

half a dozen of the other. If you do not pay the bill in road-building you pay it in higher cost of transportation, and vice versa. In either case it is the general public that pays the bill.

First Aeronautical Exposition for Holland

WASHINGTON, May 14—During July and August an International Aeronautical Exposition will be held at Amsterdam, Holland, under the auspices of the Chambers of Commerce of Amsterdam and Rotterdam, the secretaries of the Interior, War, Agriculture, Commerce and Water Works, the governor of the province of North Holland and the chairman of the Royal Dutch Association of Aircraft. Foreign airplane industries will also take part.

The exposition will include aircraft and all aids to air transportation, but aircraft designed primarily for military use will be excluded. The motor industry will be represented as will parts and accessories. Demonstrations and air contests will also form part of the program.

Exhibits will be accepted commencing June 15. Further information can be procured from the commercial attaché of the Royal Netherlands Legation, Washington, D. C.

U. S. Rubber Offers Common Stock to Employees at \$70

NEW YORK, May 15—Employees of the United States Rubber Co. have been offered the chance to purchase common stock of the company at \$70 a share. It is now selling on the market for \$95. Employees will be given 5 years in which to pay for subscriptions.

Square Turn Tractor Elects Officers

NORFOLK, NEBR., May 12—New officers elected by the Square Turn Tractor Co. are: President and general manager, R. Florian; vice-president, G. S. Albaugh; vice-president, C. E. Burnham; treasurer and secretary, William G. Eppley; production manager, F. E. Wilson; sales manager, F. H. Squires; chief engineer, A. J. Colwell.

Claudel Carbureter in American Production

NEW YORK, May 15—The Claudel carbureter, patented in France in 1902, will be produced in America by E. J. Conill and Israel Ludlow. Offices here are in the Aeolian Building. The Detroit branch will be in the Garfield Building in charge of Frank R. Jackson, for many years with the Zenith Carbureter Co.

A. H. Doolittle, sales manager of the Zenith Carbureter Co. for several years, and lately general manager of the Sunderman Carbureter Corp., will be general manager.

Internat'l Harvester Makes \$14,985,325

Statement for Year Combines Two Merged Companies—Effects of War

CHICAGO, May 14—The International Harvester Co., which is the company formed by the merging of the International Harvester Co. of New Jersey and the International Harvester Corp., shows an increase of \$2,326,000 in its profits for 1918 over the combined profits of the two companies in 1917. A considerable part of the earnings came from the company's steel business, sales of motor trucks and government contracts.

Following is the complete balance sheet of the International Harvester Co. of New Jersey and the International Harvester Corp. combined for 1917, and the balance sheet of the merged companies into the present International Harvester Co. for the year ended Dec. 31, 1918:

ASSETS		
	1918	1917
Property account,		
plant, mines and		
timber land, etc....	\$65,694,250	\$62,510,405
Inventories	114,516,302	78,682,825
Notes and accounts		
receivable	35,800,926	40,860,374
Fire insurance fund..	1,258,950	1,258,950
Pension fund.....	1,000,000	
Cash	28,040,060	35,258,327
Deferred charges.....	335,934	149,481
Investments	11,737,597	15,191,670
Funds withheld in		
Europe by war con-		
ditions	24,834,972	35,312,972
Total.....	\$283,218,991	\$269,225,004
LIABILITIES		
	1918	1917
Preferred stock.....	\$60,000,000	\$60,000,000
Common stock.....	80,000,000	80,000,000
Bills payable.....	10,370,000	12,784,300
Accounts payable.....	35,882,912	29,052,928
Reserves	26,679,417	24,786,438
Preferred dividend		
payable	1,050,000	1,050,000
Common dividend pay-		
able	1,200,000	500,000
Surplus	68,036,662	61,051,338
Total.....	\$283,218,991	\$269,225,004
Profit	\$14,985,325	\$12,560,315

The 8-hr. day was made effective by the International Harvester Co. in all American plants during the year and the wage increases have brought the present hourly wages 100 per cent above those of 1914. The French factory near Lille is being re-equipped after being stripped of all machinery and material by the Germans. The factory at Neuss, Germany, is under the jurisdiction of the allied army of occupation. The Russian factory near Moscow was running at last reports, but all American employees were forced to leave by the end of 1918. A few of the Russian branch houses are still in operation, but most have been

closed. To meet the depreciation of the Russian investment, \$24,205,000 was charged off in the past two years. The Harvester industrial council adopted in March is now in operation in 19 of its 20 plants in the United States and Canada.

Government to Buy Airplanes

WASHINGTON, May 14—Plans of the Army Air Service are for the purchase of about 500 airplanes of the approved army types. Contracts have been prepared and sent to Secretary Baker for his consideration. The primary purpose is to keep the industry in sufficiently active condition to insure rapid expansion in case of emergency.

The seven types of planes approved by the Air Service, and which will probably be purchased, include the Le Pere observation, the Hoening monoplane, the Thomas Morse scout, the US-D 9-A day bomber, the Voight training plane, the Martin day bomber and the ordnance engineer pursuit plane. With the exception of the Voight, all of these types were developed in the United States during the war.

The Air Service also plans to further encourage the airplane industry by recommending that the War Department and other government agencies lend domestic manufacturers their assistance to develop markets for airplanes in South and Central America.

New Road Work Records Made in April

WASHINGTON, May 15—During April, 1919, the Secretary of Agriculture approved project statements for 120 Federal aid projects, involving the improvement of 923.53 miles of road at a total estimated cost of \$16,261,326.51, and on which Federal aid in the amount of \$7,528,550.68 was requested. This represents the largest number of project statements approved, the largest total estimated cost, and the greatest amount of Federal aid requested during any month since the passage of the Federal Aid Road Act in March, 1919, which surpassed all records in these items up to that month.

During April 55 road projects were approved and executed involving the improvement of 521.51 miles of road at a total estimated cost of \$4,626,415.48, and on which \$2,039,614.99 Federal aid was requested and set aside in the Treasury. In addition, agreements to cover 72 other projects were placed in process of execution during the month.

Up to and including April 30, 1919, statements for a total of 1057 projects had been approved, after deducting all approved projects cancelled or withdrawn by state highway departments. The 1057 projects involved 10,580.17 miles of road, a total estimated cost of \$92,933,121.81, and a total of \$36,576,857.48 Federal aid. On the same date a total of 535 project agreements had been executed, involving 4,624.83 miles of road, a total estimated cost of \$39,059,327.44, and a total of \$15,614,929.61 Federal aid.

Reservations Coming Fast for S. A. E. Summer Meeting

NEW YORK CITY, May 15—Reservations for the summer meeting of the Society of Automotive Engineers to be held at Ottawa Beach, Lake Michigan, June 23-27, are coming in at the rate of 40 to 50 per day. Reservations with checks have been received from 250, and promises are that the hotel capacity will be sold out by June 1 or soon after.

It would be almost impossible to find a summer hotel better suited for such a convention. The exclusive use of the hotel for the period of the convention will enable the members to get better acquainted, and to talk over matters relating to engineering that they have not had an opportunity to do since the war. The professional program is being so arranged that approximately 50 per cent of the time will be free for discussion of papers and addresses. Instead of having two sessions per day, one in the forenoon and one in the afternoon, there will be an extra long morning session and no sessions in the afternoon.

A new feature of the meeting will be hour lectures each evening after dinner and before the dancing starts at 9 o'clock. These lectures are to be on popular subjects, some related to engineering and others not.

Arrangements are being made for the entertainment of the women. Forenoon lectures by important women outside of the society are being arranged. There will be various amusements, sport tournaments, and other diversions.

Curtiss Seeks Injunction for Commercial Sale of Government Planes

BUFFALO, May 14—The Curtiss Aeroplane & Motor Corp. has begun suit in the United States Court to restrain the United Aircraft Engineering Corp. from selling airplanes purchased from the British government in Canada to buyers in the United States. The Curtiss company alleges that the sale of these planes would be an infringement on 13 patents which it owns, some of them controlling and others covering certain structural features of the planes. The bill states that the planes were manufactured by the British government in Canada under rights granted by the Curtiss company on condition that they were to be used only for war purposes, that is, for training in Canada only.

Building Back to Commercial Work

BOSTON, May 14—The Ford Motor Co. building in Cambridge, which was turned over to the Quartermaster Department early in the war, was returned this week to its owner. Since the beginning of the war the Ford building has been the chief quartermaster store for the Boston district and a vast quantity of army supplies have been shipped from there. Considerable readjusting will be necessary before the building is ready for the assembly of cars. The offices on

Brookline Avenue have been moved back to Cambridge.

All Air Pilots Must Be Licensed

WASHINGTON, May 10—All civilians who pilot aircraft, including seaplanes, airplanes and balloons, must obtain licenses from the joint Army and Navy Board of Aeronautic Cognizance. A heavy fine is attached to operation without license. Application can be made to Lieut. A. J. Clayton, Building D, Sixth and B streets, Washington, D. C.

May Buy More Hispanos

NEW YORK, May 15—It is reported that the Government shortly may place orders with the Wright-Martin Co. for a quantity of Hispano-Suiza engines. It is stated that the order may amount to \$5,000,000.

Lauraine Magneto for Long Island City

LONG ISLAND CITY, May 14—The Lauraine Magneto Co. is building a factory here and will move its machinery from its Menominee, Wis., plant to the new building shortly. The new structure is 150 x 100 ft., giving a floor space of 15,000 sq. ft., and having a capacity for 50,000 magnetos in 1919. Plans call for doubling production facilities next year, giving an output of 100,000.

Stevens Named Rex Vice-President

PONTIAC, May 14—Guy N. Stevens, assistant secretary of the Olympian Motors Co., has just resigned, to become vice-president and treasurer of the Rex Tool & Machine Co. He is also assistant secretary of the Power Truck & Tractor Co., Detroit.

French Tractor Design

(Continued from page 1049)

is a very compact machine with engine forward, engine base and gearbox in one casting, and drive taken to all four wheels. The machine has four speeds, two of which are calculated for use in the field, and two when the tractor is employed on the road.

The Gnome & Rhone machine is marketed under the title of the Aurore. It is being sold at \$2,400, which is a very low price compared with other and similar machines shown at the demonstrations. One of its features is the use of a detachable strake of a very simple and practical nature. This is in three sections for the entire circumference of the wheel, and is attached to the latter by means of lugs in the inner face which pass through holes on the wheel rim and are then secured by a bolt. The entire set can be fitted in five minutes and taken off in less than two minutes.

Erie Tire Ready for Production

SANDUSKY, OHIO, May 9—The Erie Tire & Rubber Co. will begin manufacture about Aug. 1. The company will specialize in cord tires and tubes. It is organized under the laws of Ohio with

an authorized capital stock of \$1,000,000, half of which is 7 per cent cumulative stock and half common stock. The officers are: President, C. H. Berlekamp; vice-president, H. H. Forest; treasurer and general manager, P. F. Wills; secretary, C. H. Roth.

Advance in Steel Plates

NEW YORK, May 14—The Lukens Iron & Steel Co. is the first to raise the price of steel since a free market was created by the abandonment of the stabilization plan by the government and the industry. It has raised the price of steel plate \$2 a ton. Although this is the first move toward an increase in steel there is a general feeling in the industry that it is a forerunner of a general rise in prices.

Appleton Engine Works in New Building

APPLETON, WIS., May 10—The Appleton Engine Works has purchased a vacant building at 1019 College Avenue and after remodeling and enlarging the structure will transfer its entire operations to the new location. The capacity will be increased threefold when the improvements are completed June 15.

Young Industries Buys Factory in Jackson

DETROIT, May 10—L. A. Young Industries, Inc., has purchased the factory of the Borden Mills Co., Jackson, Mich., with 150,000 sq. ft. of floor space, and will announce shortly the purchase of another plant in the state. Both of these factories will be operated as part of the wire division of the company, and men and machinery will be removed from Detroit to operate them.

Ford Planning Foreign Production

Factories for Italy, France, Russia and Germany—Assembly Plants for Smaller Countries

DETROIT, May 12—Ford Motor Co. officials state that as soon as the peace treaty is signed, immediate steps will be taken for building several assembly plants in European countries, besides factories in many of the foreign nations such as Italy, France, Germany and Russia. In the smaller countries such as Denmark, Spain and Portugal, assembly plants will be erected with an average capacity of 100 cars per day. These latter plants will be the first constructed and will become the clearing houses for the parts supplied to them from the Detroit and Manchester, England, factories. Cadiz and Copenhagen have already been decided upon as cities where assembly plants will be erected, each to cost approximately \$350,000.

By this system the Ford interests expect to be able to place on the European market at least half a million cars annually. It is but a question of weeks when the Paris and Bordeaux offices of the company will be re-opened.

Ford officials will not deny that the present sites decided upon for tractor plants are Troy, N. Y., and Pennsgrove, N. J., and that the Troy plant will also manufacture the standard Ford car.

At the Ford plant, figures obtained show that from April 28 to May 6 inclusive, 21,761 cars were manufactured, being a daily average of 2720. The most productive day during this 8-day period was April 29, which shows a total output

of 3312, and May 1 the smallest output, 2651. For the month of April, which contained 26 working days, the plant's output totaled 69,947, a daily average of 2689. The actual number of unfilled orders April 20 was 80,283, which was increased to 88,528 on May 8.

Ford officials are confident that, beginning June 1, the daily average output will be 4000, and that the number for the present year will exceed 1,000,000. This enormous output of cars requires the services of approximately 40,000 men. The number now on the Ford payroll, which includes the car, shipbuilding, blast furnace and carburetor plants, is 53,650.

Fordson Production After Inventory

DETROIT, May 12—The Fordson Tractor plant at Dearborn is starting production again after a 15-day suspension of operations for inventory. While it may be two or three weeks before the company gets into full production, operations started this week with a fairly large force. The company found that it was overstocked with certain materials and to bring conditions to a balance again, operations are being pushed in the over-stocked departments and curtailed in those where conditions are normal.

General Motors Discloses Further Plans

DETROIT, May 9—Plans for the development of the General Motors property on both sides of Holbrook Avenue have been disclosed with the application of the General Motors Corp. to the city council for permission to run two side-tracks across Holbrook Avenue. This tract will contain an engine plant, differential gear plant, a die shop, heat-treating plant, forge shop of the Central Forge Co., and an axle plant. Later a large truck assembly plant will be erected. The land comprises nearly 60 acres. The new plant of the Cadillac Motor Car Co., Detroit, has been planned for the old American Car & Foundry site on Scotten Avenue and will be one of the largest of the General Motors projects.

War Contracts Reduced from \$5,600,000,000 to \$500,000,000

WASHINGTON, May 12—More than 90 per cent of the war contracts placed and outstanding on Nov. 9, 1918, have been completed either by termination or delivery, being reduced from \$5,600,000,000 to \$500,000,000. Cancellations and suspensions reported for the two weeks ended April 12 totaled \$70,000,000, and delivered \$50,000,000. Following is the status of cancellations on April 12 of the air and motor contracts:

	Bureau of Aircraft Production	Motors and Vehicles
Contracts outstanding Nov. 9, 1918a	\$672,849	\$441,691
Reductions since Nov. 9, 1918, by termination	498,039	294,238
By deliveries	160,000b	126,827
Remaining outstanding	14,810b	20,626
(a) Some items include subsequent commitments.		
(b) Estimated; subject to revision.		



Great Britain's Giant Floating Airdrome H. M. S. Furious, which not only carries airplanes but an airship besides

Petroleum Products for February

Production Decreased Slightly But
Stocks Are Satisfactory and
Position Is Good

PRODUCTION			
	February, 1919	January, 1919	
Crude oil (bbl.).....	25,232,876	26,967,332	
Gasoline (gal.).....	283,518,194	303,710,556	
STOCKS ON HAND			
	Feb. 28, 1919	Jan. 31, 1919	
Crude oil (bbl.).....	14,820,601	15,380,185	
Oils purchased to be re-run (bbl.).....	1,176,483	1,088,264	
Gasoline (gal.).....	458,449,187	383,212,692	
Kerosene (gal.).....	303,062,436	332,393,181	
Gas and fuel (gal.).....	692,816,000	646,411,414	
Lubricating (gal.).....	152,297,163	158,370,431	
Wax (lb.).....	209,908,707	189,064,329	
Coke (ton).....	33,716	28,732	
Asphaltum (ton).....	102,547	93,027	
Miscellaneous (gal.).....	500,413,825	483,942,833	

WASHINGTON, May 14—Although production of both crude oil and gasoline shows a slight decrease over January figures, stocks of gasoline and fuel oil on hand show an increase, marking the tendency to catch up with production to some extent. At the present time the stock of gasoline on hand is 75,236,495 gal. more than it was in January and there are 46,404,586 gal. more fuel oil on hand.

Almost all through 1918 the consumption of petroleum products exceeded the production. It was almost the end of December before the production was in excess of consumption. In January, 1919, both production and consumption dropped to some extent. However, consumption dropped to a greater extent than production, thus improving the general situation.

During February the position continued to improve, and a curve showing the situation would indicate that production for the month was decidedly above consumption. Obviously consumption, so far as use by passenger cars is concerned, was at a low point in February, as in other winter months, but road transport by truck has been on the increase and was maintained throughout the winter on a larger scale than heretofore.

N. A. C. C. Will Fight Chassis Tax

WASHINGTON, May 13—The National Automobile Chamber of Com-

merce has filed a protest with the Treasury Department against the rulings on the tax for chassis. Under the present ruling, if a manufacturer sells a chassis directly to a consumer there is one tax of 5 per cent paid. If a manufacturer sells a chassis to a dealer there is no tax paid by the manufacturer if the dealer knows for what purpose it will be used, and fills out certain necessary papers. If, however, the dealer is unable to definitely specify how the chassis will be used, by whom, etc., the manufacturer pays a tax of 5 per cent.

If the manufacturer sells the chassis to a distributor and he in turn sells to a dealer both pay a tax. If a dealer sells a chassis he pays no tax unless he attaches a body to it, when it is regarded as a manufactured vehicle and again becomes subject to taxation, 3 per cent for a truck and 5 per cent for a passenger car. It is expected that there will be some time required before the tax department will give a new ruling on this.

P. T. Tractor Wheel Acquired by Wm. Wharton

EASTON, PA., May 14—The Wm. Wharton Jr. Co., associated with the Tylor-Wharton Iron & Steel Co., has acquired the patent rights and will manufacture the P. T. wheel for tractors and trucks. The P. T. wheel, originally an Italian invention, was formerly made in the United States by the P. & T. Wheel Corp., Dayton, Ohio. A complete description of it appeared in a former issue of AUTOMOTIVE INDUSTRIES.

Building Factory for Transport Truck

MT. PLEASANT, MICH., May 10—Work on the new plant of the Transport Truck Co. has commenced. The buildings will cost \$150,000 and will be ready for operation before the end of the year. The officers of the company are: President, M. A. Holmes; vice-president, H. E. Chatterton; secretary, W. D. Hood, and treasurer, A. E. Gorham. The capital stock of \$1,000,000 is half paid in. At the company's present quarters two models are being built, a 1½-ton and a 2-ton truck. When the company gets into its new factory two more models will be built.

50% Detroit's Contract Claims Approved

92 Per Cent Filed—70 Per Cent
Aircraft Claims Recorded—
Problems of Settlement

DETROIT, May 12—Greater progress has been made in this district by the Government Claim Adjustment Board during the past 30 days than at any other time since the organizations were established to aid the war contractors in getting settlements of war contracts. Approximately 92 per cent of a total of 236 claims have been filed with the Ordnance Claim Board. The total value of these contracts now up for settlement or already settled at Washington is approximately \$25,000,000. The percentage of claims approved at Washington is about 50 per cent.

40 Per Cent of Aircraft Claims Approved

During the last two weeks things have not moved as fast with the Aircraft Board as with the Ordnance organization. All of the big aircraft claims are still out and may not be filed for some time. Approximately 40 per cent of the total of aircraft claims in this district have been approved at Washington. Thirty per cent are now before the board and 30 per cent remain to be filed. Officials of both boards, however, predict that settlement matters will move rapidly from now on. Many points which have been holding back claims have been cleared up at Washington and new regulations are greatly simplifying the work of the board.

Claims officials declare they have received no information from Washington relative to the suspension of work May 15. They look upon the publicity sent out by the Secretary of War's office calling attention of contractors to the necessity of filing their claims before May 15 or seeking redress elsewhere as a rather crude method of stirring the contractors into action. There is no question, however, but what this publicity has had a marked effect, as more claims have been filed within the last two months than during any other period. All boards will continue to function as in the past until

Output of Refineries of the United States by Months

	Crude (bbl.)	Other Oils (bbl.)	Gasoline (gallons)	Kerosene (gallons)	Gas and Fuel (gallons)	Lubricating (gallons)	Wax (pounds)	Coke (tons)	Asphaltum (tons)	Miscel- laneous (gallons)	Losses (bbl.)
1918											
January.....	23,842,587	2,300,334	242,632,044	119,358,184	547,866,248	56,623,425	39,288,858	41,216	54,854	70,995,829	1,078,181
February.....	23,386,676	2,298,333	234,324,618	121,218,320	510,165,397	58,300,914	35,087,337	42,371	42,033	75,134,088	983,992
March.....	26,239,662	3,696,872	269,627,968	151,228,007	587,985,804	69,308,351	43,597,019	44,248	56,901	84,865,148	1,097,489
April.....	26,201,544	3,956,244	293,396,162	153,703,682	578,255,341	71,022,204	40,173,524	45,674	51,242	89,242,012	1,182,020
May.....	28,510,698	4,112,023	319,391,202	160,590,760	631,586,209	79,589,735	42,544,633	48,864	60,449	88,627,491	1,269,281
June.....	28,140,479	3,483,270	315,023,445	151,840,252	628,842,033	74,420,996	41,317,794	46,605	50,321	81,110,922	1,282,177
July.....	29,170,718	5,951,537	332,022,095	156,828,826	658,439,682	79,303,107	41,691,551	48,914	58,433	159,374,139	1,338,304
August.....	28,534,275	6,376,353	330,335,046	149,678,850	671,113,871	72,892,879	41,829,516	51,759	59,715	163,345,034	1,337,327
September.....	28,390,431	5,485,747	314,595,959	164,963,798	653,085,050	70,593,079	42,704,894	48,052	49,157	138,201,963	1,236,834
October.....	29,237,767	5,571,847	314,251,318	164,928,640	661,780,441	72,244,633	43,470,132	48,820	51,878	166,109,867	1,161,545
November.....	27,411,636	3,857,754	312,968,640	169,278,105	604,403,494	72,178,602	49,642,007	51,393	35,387	75,430,160	1,236,818
December.....	26,958,157	3,474,890	291,744,465	161,742,713	587,873,987	64,987,842	43,847,092	41,747	37,596	84,273,730	1,352,657
Total.....	326,024,630	50,565,204	3,570,312,963	1,825,360,137	7,321,397,557	841,465,767	505,144,357	559,663	607,968	1,286,710,383	14,556,625
1919											
January.....	26,967,332	3,919,492	303,710,556	158,501,260	589,630,056	68,304,613	44,987,603	59,003	54,074	92,324,236	1,183,767
February.....	25,232,876	3,997,025	283,518,194	164,181,787	553,853,753	62,503,072	42,702,886	57,200	41,348	88,515,735	1,115,040
Total.....	52,200,208	7,916,517	587,228,760	322,683,047	1,143,483,809	130,807,685	87,690,489	116,203	95,422	180,839,971	2,298,807

orders bringing work to a stop are issued at Washington.

While contract settlement delays caused many local concerns financial embarrassment, no real hardships resulted except in a few isolated cases. Four firms agreed to a 75 per cent settlement in order to get immediate cash, leaving the remaining 25 per cent to be settled later when the government completes checking up invoices and claims.

It was not until March 2 that Congress passed the law permitting settlement of informal contracts by validating them. Until the Dent bill became a law, the adjustment boards were limited to action on formal contract claims only. Inasmuch as more than two-thirds of all war claims in this district were of an informal nature, the majority of the work of both boards was held up, awaiting congressional action.

The greatest problem of settlement resulted from the action of the government in shifting all contracts from a fixed price basis to a cost plus 10 per cent basis. This caused all companies affected to make radical changes in their manufacturing plans. There are companies who will be heavy losers as a result. For instance, a certain automobile company contracting for the manufacture of shells at a fixed price carries a large portion of its employees on its regular automobile payroll contemplating a big profit on shell manufacture by cutting overhead to a minimum. It filed with the government a cost estimate on the price of shell manufacture according to that plan. When the government automatically switched contracts to a cost plus 10 per cent basis, the company having already gone upon record regarding shell production costs, was obliged to start up its munition work as separate departments, hiring additional men and conducting the work at excessive expense if not actual loss. There are others in the same fix, it is said.

All contract adjustment boards say it will be along in July before the last claims have been filed and settled.

Pan American Convention

WASHINGTON, May 12—The Pan American Convention, which will be attended by delegates from various industries of the United States and representatives from the Pan American countries, will be held in Washington, June 3-6, at the Pan American Building.

Detroit Will Hold Prosperity Dinner

DETROIT, May 10—The May meeting of the Detroit Section of the Society of Automotive Engineers will be preceded by a prosperity dinner to be held at the Hotel Pontchartrain. The meeting will take place on May 23 and the dinner is scheduled for 6 p. m.

At the meeting held immediately after the dinner, Prof. W. T. Fishleigh of the University of Michigan will talk on "An Automotive Nation Victorious, and Its Prime Demands Upon Manufacturers, Engineers and Educators." The banquet speaker will be announced later.

Stagnation in British Car Industry

Production Small and Prices High—Used Car Prices Soaring—Buyers Offer Premiums

LONDON, ENGLAND, May 1—Uncertain conditions in the automobile industry, and a stronger spirit of procrastination than has been seen since the first of the year, continues.

In Coventry, which is one of the big centers, there is a dominating spirit of comparative stagnation in the industry. No one as yet seems to have gotten under way. Some makers are blaming labor. There are intimations that the salvation of the British motor industry rests in the influx of new blood into many of the older organizations. There are three or four firms coming into the industry from other branches of engineering and these have the necessary capital and apparently the proper spirit of progress.

There is a big amalgamation coming through in the automobile industry which points to the fusion of the Armstrong-Whitworth Co. and the Siddeley-Deasy Co. The latter firm is one that has made great progress during the war. In 1914 it had 3 acres of factory and now has 25. Siddeley-Deasy is one of the first to plan a low-priced car.

There still seems to be too much of the "getting it while the getting is good" spirit among car manufacturers, and prices are exceptionally high, as indicated by a 12 hp. car listing at \$3500. There is no tendency to reduce prices, and naturally with comparative stagnation through the industry there is a shortage of cars. The private owner is faced with the fact that a car which sold for \$1500 two years ago is now selling at \$2500.

Production which was promised by the factories a month or so ago is not coming through. There are many deposits up on these cars and the buyers are awakening to the fact that when their deposit was taken the manufacturer must have been conscious of the fact that he could not make deliveries for many months. It seemed as if the manufacturer did not understand the situation well enough, and was not willing to go ahead with the production until he had orders and deposits placed with him. This points to the program followed by so many manufacturers in pre-war Olympia shows.

Production on a few of the lighter type cars is coming through. With high priced cars the production is so small as not to have any modifying effect on the market. Fine weather has spurred the buyer and the pernicious practice of offering premiums is making itself known. In one case a premium of \$500 over the new price was offered on delivery on a 10-hp. car if the owner could have it by Easter.

As a result of holding back in the pro-

duction of new cars the price of used cars is still increasing. Recently a 1913 French car was purchased for \$650 and was sold a week later for \$1750. This is not an exception and almost every day sees the value of used cars mounting in this way. There are 1914 Rolls-Royce touring cars selling at \$10,000. Four years ago these cars were selling at \$5,000 each. In 1915 a 15 hp. Renault limousine listed at \$1560, but is now priced at \$7500. Wolseley cars which 4 years ago listed at \$2250 are now offered at \$4500. These examples are typical of the increased prices of used cars.

British Import Restrictions Not Satisfactory to Importers

LONDON, ENGLAND, May 1—British importers are still of the opinion that the permitting of imports of American automobiles under the recent ruling of the Board of Trade is scarcely satisfactory to a minority of the importers, and that after September 1, when the matter is revised by the Board of Trade, some more satisfactory arrangement will be worked out.

The present ruling which permits of importing approximately 1200 automobiles in that period is a mere ration of the requirements, as there are some importers who have capacity for disposing of 6000 cars per year.

There has not as yet been an official interpretation of the 50 per cent ruling on imports, but one is to be issued shortly. There is a feeling that the concession for 50 per cent importation granted by the Board of Trade is open to a more favorable interpretation than that given. The action of the Board of Trade is awaited in clarifying this interpretation.

There have been some recent removals of import restrictions made by the Board of Trade as follows:

A—Prohibition of magnetos is to be maintained and licenses to import magnetos are to be granted only in very exceptional cases. This points to a certainty of the British magneto industry, which is a product of the war, being protected during the restriction period.

B—Forgings and castings for motor vehicles are to be prohibited and importation only under licenses.

C—The importation of clocks, clock parts, and clock movements is to be restricted to 50 per cent of the 1913 imports from all sources, importers obtaining their quotas from any country with which trading is permitted.

Lifts Ban on Passports for Business

WASHINGTON, May 12—The State Department will issue passports to all applicants who are going abroad on bona fide business, and American business men will be given every aid to carry on and develop foreign trade.

Import Certificate Number No Longer Necessary

WASHINGTON, May 10—It is no longer necessary for exporters to submit with their applications for licenses to export to Luxemburg and that part of the Rhine provinces occupied by the American and allied armies the number of the import certificate issued by the

Inter-Allied Economic Committee at Luxemburg. The War Trade Board has announced this amendment to the rulings made by it March 6, 1919. Applications for export licenses should be filed with the War Trade Board on Form X-A.

Manufacturers and Government Will Meet to Discuss Exports

WASHINGTON, May 12—A meeting to discuss existing embargoes and foreign trade restrictions, and their effects on the motor industry, will be held here soon. Automobile manufacturers and the Departments of State and Commerce will attend. The meeting was planned for this week, but was postponed. It will probably be held the first week in June owing to the inability of some of the manufacturers to get to Washington sooner.

Freight Rates for Trucks to Be Studied

WASHINGTON, May 10—A study of existing railroad freight rates and motor freight rates will be made by Capt. A. J. Stevens, assigned from the Department of Purchase, Traffic and Storage, War Department, to the Highways Transport Committee, National Council of Defense, for the purpose of fixing equitable and profitable rates by which motor trucks can haul commodities over rural routes. Existing rates, it is said, are neither equitable nor profitable, and many motor truck fleet owners are losing money in some instances and overcharging in others. It is to overcome these problems and to establish motor truck rural express on a sound basis that the work is being undertaken.

Steel Disk Wheels Wanted for Light Trucks

WASHINGTON, May 12—Orders will be placed for 550 steel disk wheels to take 38 x 7 pneumatic tires with straight sides. The wheels are to fit on the hubs of the rear wheels of the light aviation army trucks which have been taken over by the Post Office Department from the War Department. They are to be interchangeable with the wheels now on the trucks. A hub cap, locking flange, necessary clamping nuts and cap screws are to be furnished with each wheel. Prices are to be f.o.b. factory, and bids must include time of delivery. All bids should be sent to the Purchasing Agent, Post Office Department, Washington, D. C.

Tractor Demonstrations for Pennsylvania

HARRISBURG, May 10—The state of Pennsylvania is to hold four 2-day tractor demonstrations during the coming season. These will be held in different sections of the State. Representatives of various tractor companies have agreed on this schedule. There is a little uncertainty regarding the rules covering these demonstrations. Some of the tractor makers want to furnish their own rules and the State Department feels that it should have a voice in framing them.

Present Planes Lack Quantity Idea

Must Come Around to Ingersoll Type, Says Stout at S. A. E. Meeting—Other Subjects Discussed

CHICAGO, May 9—Before we can call the airplane commercially successful we must go from the Swiss watch type of construction to an Ingersoll watch type. That is, we must make our future planes of more rigid construction on a quantity basis, and correspondingly cheaper. This was the capital idea in the talk presented to the Midwest Section of the Society of Automotive Engineers this evening by William B. Stout of the United Aircraft Corp., New York City.

In his talk on aviation, Mr. Stout said that aviation is a new lure, and those men who have been up in the air, who have been flying, and who for the moment are satiated with air work, are coming back with a craving for space. In judging the airplane of to-day we must hark back to the corresponding days of the motor car, when the latter was undeveloped and as expensive a proposition as the airplane is to-day.

While we have built planes in quantity, we have not designed in quantities. At the time of the war we had to take what we had and develop it. We had no knowledge of other than amateurish materials. But with the war we have developed materials, constructions and the production end of aircraft. Good engines have been developed, possibly not the right size, but good enough for this stage of development. Now we are coming to the point where we must have greater safety than with the war machines, a place to land on small fields and at slower speeds.

Mr. Stout told further of the wonderful achievements of the wireless telephone as regards aviation, particularly in policing aerial routes and keeping the pilot informed of his location and weather conditions ahead. The speaker in taking up the subjects of parasite resistance and lift-drift ratios supplemented his talk with blackboard illustrations. He said the lift-drift ratio of the best machine is about 8.4; that is, 8.4 lb. can be carried for every pound of propeller pull. This means a limitation of loads to be carried, and fuel in proportion to horsepower. If a machine can be developed with a low enough parasite resistance, so that the lift-drift ratio is about 10 or more, then if we are lucky and have a calm day we might be able to fly from Halifax to Ireland. As yet we have not produced any such machine.

The use of steam in handling kerosene as engine fuel was the chief topic of the paper on Developments in Burning Kerosene as Motor Fuel, presented by Otto E. Szekely, chief engineer and production manager of the Velie Motors Co., Moline, Ill. The author dwelt particularly on the experiments and research work done by this concern in using kerosene with its

tractor engine. Increased volumetric efficiency, Mr. Szekely said, has been obtained by means of a fairly successful method consisting in vaporizing the kerosene and drying the mixture in connection with the superheated steam and fuel washing. This paper will be discussed at the next meeting.

Following are the new officers of the Midwest Section elected at this meeting: Chairman, Dent Parrett of the Parrett Tractor Co.; treasurer, Francis W. Parker, Jr., of the firm of Parker & Carter, patent attorneys, and secretary, C. S. Rieman of the Elgin Motor Car Co.

Industrial Board Disbanded

WASHINGTON, May 12—All attempts to fix prices of basic commodities by the government were ended when the Industrial Board, which is headed by George Peek, disbanded this last week following the refusal of the Railroad Administration to accept the steel prices as set by the Industrial Board. It is also stated that one reason for the termination of the Board was that the Attorney General found all such price fixing illegal. All of the industries which submitted figures to the Board and agreed upon prices, including steel, sand, gravel, crushed stone, glass and lumber industries, were released from the fixed and proposed prices with the termination of the Board.

Uniontown Entries Complete

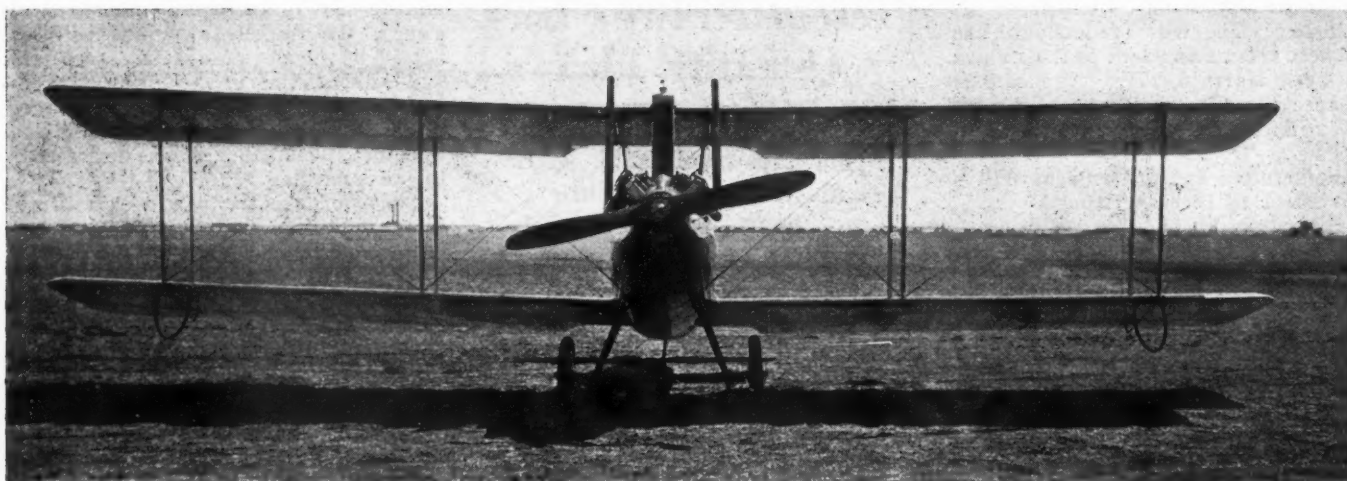
NEW YORK, May 12—The opening racing event for the year on American speedways will be the 112-mile race on the Uniontown speedway on Saturday. A good many of the racers will go from there to Indianapolis to take part in the 500-mile race on May 31. Gaston Chevrolet is entered for both Uniontown and Indianapolis if he is reinstated by the American Automobile Association by that time. If not some other driver will have to be chosen for his Frontenac special. The 16 following names are entered for the race at Uniontown:

Driver	Car
Louis LeCocq	Roamer special
Kurt Hitke	Roamer special
Eddie Pullen	Hudson special
Cliff Durant	Chevrolet special
Harold Simmons	Hudson special
Wilbur D'Alene	Duesenberg special
Denny Hickey	Stickel special
Ray Howard	Peugeot special
P. W. Monahan	Johnson special
Joseph Boyer	Frontenac special
Louis Crevrolet	Frontenac special
Gaston Chevrolet	Frontenac special
Ralph Mulford	Frontenac special
Tommy Milton	Duesenberg special
Fred McCarthy	Hudson special
Eddie Hearne	Durant special

Washington-New York Air Mail Service Completes Year

WASHINGTON, May 12—The Air Mail Service between Washington and New York has completed its first year, during which time it represents 128,037 miles of air travel and 7,720,840 letters carried. The revenue from airplane mail stamps totaled \$159,700 and the cost of the service, \$137,900.06.

The record of the entire service for the year shows 92 per cent of performance. Out of 1261 possible trips, 1206 were un-



Front view of the Curtiss Oriole, which carries two passengers in addition to the pilot

dertaken and 55 were defaulted on account of weather conditions. During rain, fog, snow and electrical storms, 435 trips were successfully made. The year's travel of 128,037 miles represents the total out of a possible 138,092 miles. Fifty-one forced landings resulted on account of weather and 37 on account of engine trouble.

One of the lessons learned from the operation of the service is that the element of danger existing in military and exhibition flying is almost entirely absent from commercial flying. The year's operation including flights at altitudes as low as 50 ft. during periods of invisibility. During the year no airplane carrying mail has fallen, and no aviators have lost their lives.

The year's flying has established the fact that 200 ft. of visibility from the ground is the limit of practical flying, although a number of flights were made at lower altitudes. This was discovered by means of a device built by the Bureau of Standards in the form of a radio directional compass. The objection to flying above the ground fog, rain, snow or heavy clouds with single engine planes lies in the possibility of the engine's stopping over a village or other bad landing place with a limited radius of visibility. Flights were made in gales from 40 to 60 miles an hour.

The same 6 planes that were in operation at the inauguration of the service are in operation to-day, and the two planes that made the initial flights on May 15, 1918, will make the initial flights on May 15, this year, to mark their first anniversary.

Salisbury to Make Axles Only

JAMESTOWN, N. Y., May 14—The Salisbury Wheel & Axle Co. has changed its name to the Salisbury Axle Co., Inc., and has discontinued the manufacture of wheels for cars

Blakely in New Factory

DETROIT, May 12—The Blakely Mfg. Co. has moved into its new factory at the corner of Wabash and Stanley Avenues.

The Oriole—New Curtiss Commercial Plane

BUFFALO, May 12—The Curtiss Aeroplane & Motor Corp. has put out its first purely commercial airplane—the 3-passenger Oriole, which was designed by W. L. Gilmore, airplane engineer for the company. The plane embodies a new idea in body construction, special ply wood being used. Longitudinal stringers, running fore and aft, add to the rigidity. The body is made in two parts and connected on the center line. It is elliptical in section and contains no real diaphragms.

The passengers' comfort has been well looked after in the design. There are no controls in the front cockpit, which seats two passengers abreast. The upholstery is of leather and a curved windshield protects the occupants and gives them a clear vision while flying.

The machine is equipped with a self-starter. It is colored to represent the oriole, the body being orange and the wings yellow and black. The engine is a Curtiss OX-5, which was used in the JN-4D training planes. The machine is 25 ft. long, 36 ft. from tip to tip and is 9 ft. 5 in. high. Its total weight, loaded, is 2188 lb. and it carries a useful load of 767 lb. It has a maximum flying speed of 85 miles per hour.

On its initial flight, the Oriole captured two prizes offered by the Pan-American Aeronautical Congress for the first airplane to fly to and from Atlantic City on the opening day. The machine was piloted by Roland Rohlfs, Curtiss test pilot, who, on the return trip, made the distance of 109 miles in 1 hr. 11 min. On the way to Atlantic City, the Oriole carried as a passenger Victor Hugo Barance, Cuban consul-general.

Proposed Air Service Between Australian Capitals

WASHINGTON, May 12—A company has been organized, according to reports, called Aircraft, Ltd., to establish interstate air service in Australia, to begin within the next year. It is expected that aerial service will be operated between

the capitals of all of the states of the Australian continent. Planes will be used to carry 20 passengers each. They will be used for both passenger and express service.

Flying Fatalities Increase

WASHINGTON, May 9—Flying fatalities at United States flying fields have increased since the armistice was signed. From June 1, 1918, to the armistice the average hours flown per fatality were 3149, while from the armistice to date the average is 1852 hours, an increase of 41 per cent.

The following table shows the pre-armistice rate compared with the monthly rate since the armistice:

Period	Fatalities	Hours flown	Hours per fatality
June 1 to Nov. 11, 1918..	156	491,283	3,149
Nov. 11 to Jan., 1919...	42	78,831	1,877
January	6	16,498	2,750
February	17	15,688	922
March	14	28,072	2,005
April	6	14,650	2,441

American Cars May Not Be Exhibited at Olympia

LONDON, ENGLAND, May 1—No decision has been made as yet as to whether importers of American cars will be permitted to exhibit at the coming Olympia show in November. Importers are not at all satisfied with the present ruling restricting automobile importations, and it would be a serious blow to them if they were not permitted to exhibit their cars at the Olympia show on a par with other makers.

Industrial Clinic for Labor

WASHINGTON, May 10—Plans for the establishment of industrial clinics by organized workers in their respective localities to be under government supervision have been laid before the 800 central labor bodies in this country by the Department of Labor. Under the plan expert medical examination, advice and treatment under government supervision will be available to the workers upon payment of fees ranging from 10 cents to \$1. Supervision of the clinics by the government will be undertaken by Dr. A. J. Lanza, Chief of the Division of

Industrial Hygiene and Medicine, Department of Labor.

If these plans are adopted by organized labor, the immediate effect will be to abolish the existing industrial health systems which are being operated by many of the large manufacturers at the expense of the various corporations. Some corporations have followed a plan of this kind for several years, examining workers upon their application for employment, including dental, eye and ear examinations, and maintaining a corps of doctors and nurses to look after the health of the employees and visit those who are ill. There has been some objection to this plan voiced by organized labor on the ground that there is likely to be discrimination against union workers. The new plan, it is thought, will be more favorably regarded because it eliminates this possibility.

Citroen Workers on Strike

PARIS, April 23—All the men in the Citroen automobile factory came out on strike this week. The men asked for the abolition of night work and overtime, the immediate adoption of the 8-hour day without a reduction in wages, and an increase of 5 cents an hour on all salaries. The Citroen company decided on a lock-out, and this was followed by a general strike of the 6000 workpeople employed by the firm. It is maintained by the workers that wages are lower in the Citroen factory than in other similar establishments.

Italian Factories Closed Through Labor Disputes

PARIS, April 23—Information is received from Turin, Italy, to the effect that practically all the automobile factories are closed owing to labor troubles. The disputes affect Fiat, Lancia, Scat, Isotta-Fraschini and others.

AC Speedometers in Production

FLINT, MICH., May 10—Manufacture of AC speedometers has been started by the Champion Ignition Co., maker of AC spark plugs. At the time of the armistice 40,000 AC aviation spark plugs were turned out daily for the government.

The plant built for government work will be used for the production of spark plugs and speedometers. Jo Berge will be in charge of the speedometer development and manufacturing departments.

Dodge Bros. Open Export Office in New York

NEW YORK, May 9—Dodge Brothers, Detroit, have opened an export office here at 43 Exchange Place. John C. Mathews, who for a number of years has represented the Dodge foreign sales department in this city, will be in charge of the new office.

Dividends Declared

Studebaker Corp. of America, South Bend; quarterly dividend, 1 per cent common, 1½ per cent preferred, payable June 1 to stockholders of record May 20.

Michigan Housing

Situation Critical

LANSING, May 10—The housing situation here is becoming critical. With all of the city's industries reaching capacity production and many planning to greatly increase their output, Lansing faces a shortage of labor as well as homes to house the workers. The General Motors Corp. expansion plan calls for the erection of hundreds of houses for Oldsmobile workers and other G. M. C. concerns. Inasmuch as the industrial boom is general, the new G. M. C. homes will not begin to care for the existing shortage and the influx of new families. The Chamber of Commerce and many individual companies are working on plans to solve the housing problem.

MUSKEGON, MICH., May 10—Muskegon will build between 750 and 1000 new homes this summer, which number is sufficient to relieve the present shortage of homes, which is not serious here. The Muskegon Building & Loan Association, by the formation of a mortgage loan company with a liberal loaning policy has increased its capital and activities. Local manufacturers are not building homes for their workmen. This plan was tried some years ago but the workman did not readily respond to the idea of buying his home from his employer.

PONTIAC, MICH., May 10—The Beudette Body Co. is backing two hotel projects for housing its workmen. The company has also provided temporary working quarters for a limited number of men in one of its buildings.

The General Motors Truck Co. has leased the Wellington Hotel and will provide rooms there for 100 men. The Oakland Motor Co. is rushing work on an apartment for men, and the Wilson foundry rooming house is nearing completion. Several hundred single men will be accommodated in these buildings. The result is expected to bring about a sharp decline in rental of houses and rooms in Pontiac.

GRAND RAPIDS, MICH., May 10—The housing situation in Grand Rapids is quite satisfactory. There is only a slight shortage of homes at the present time. This city ranks second in the United States as to the percentage of home ownership, being surpassed only by Spokane, Wash. Five building and loan associations have over 4,000 borrowing members.

A number of contractors are building homes for 10 per cent down and 1 per cent a month. It is estimated that 500 new homes would adequately relieve the situation, but the possibilities are that before fall the city will need more than this.

Canadian Maxwell and Chalmers Orders Ahead of Production

WINDSOR, ONT., May 9—The Canadian plants of Maxwell and Chalmers are

far behind in filling orders. February shipments were only 65 per cent of February orders. The March record is about the same in spite of the fact that the plant is working on its midsummer schedule. Production is difficult, it was explained, because material continues to be as hard to get as it was a year ago.

Detroit Seamless Tube Plant Started

DETROIT, May 12—The Detroit Seamless Steel Tubes Co. has begun construction of a \$3,000,000 plant on a 60 acre tract on Warren Avenue. The first section, costing \$1,000,000, will be completed by Jan. 1. The company's present location has been sold to the Pennsylvania Railroad.

The structure will be steel and glass with brick and concrete facing. The roof will be of tile. The plant proper will occupy a space of 350 x 550 ft. It will consist of three buildings for manufacturing, a separate heating plant and a 2-story administration building. The three manufacturing units will each be 90 x 550 and 45 ft. high.

About 150 homes for workmen of the company will be built in the vicinity of the plant. The total capacity of the first unit will be 2,500 tons of seamless steel tubing a month, the range of sizes being from ½ in. to 6 in. in diameter.

Cletrac New Name for Cleveland Tractor

CLEVELAND, May 9—The Cleveland Tractor Co. has adopted the name Cletrac as the registered name of its tractor. Tank-type-tractor is used in connection with the name, as it is of crawler construction.

Acason Truck Sales to Be Handled from Factory

DETROIT, May 9—Sales and service of the Acason motor trucks will be handled direct by the factory, according to an announcement by Vice-President and Director of Sales Harry Conlon of the Acason Motor Truck Co. The sale of Acason trucks at retail in Detroit and wholesale for Michigan will be handled by a special department of the factory, which will be in charge of H. P. Mills. Arthur C. Acason will assist Mr. Mills.

L. V. Estes Moves

CHICAGO, May 9—L. V. Estes, Inc., industrial engineer and accountant, has moved its offices from the McCormick Building to the fifteenth floor of the Century Building, 202 S. State Street.

U. S. Light & Heating Building

NIAGARA FALLS, N. Y., May 9—The U. S. Light & Heat Corp. is adding several new brick and concrete buildings to its present plant, which consists of 22 units, to give the company increased manufacturing facilities. Work is already under way. Several acres of adjoining property have been acquired for further expansion.

Ford's Mammoth War Work

DETROIT, May 12—Government war contracts held by the Ford Motor Co. exceeded \$560,000,000 and represented work for the Army, Navy and Air Service. The following items will give some idea of the work done by the Ford interests during the war:

More than 2,000,000 steel helmets.
Order for 5000 12-cylinder Liberty engines. Over 1500 had been delivered when the armistice was signed, and the company was just striking production capacity.
10,000 caissons, mainly for 155 mm. guns. Something over 8000 delivered.
Order for 112 "Eagle" boats, 200 ft. long, 25 ft. beam. Something like 25 delivered when the order was reduced to 62. The balance will be finished by Aug. 1.
More than 8000 trucks.
More than 25,000 regular Ford cars.
More than 6000 ambulances.
400,000 cylinders for Liberty engines. The government placed the order with the Ford Motor Co. to make all the cylinders for all the Liberty engines made in America. The original order was practically completed when the armistice was signed, and a new order for \$300,000 had just been entered.
700,000 bearings for the Liberty engine. The government placed the order with the Ford company for all the bearings for all the Liberty engines made in the United States. On this order over 400,000 bearings had been delivered.
700,000 cylinder forgings for Liberty engines. The government placed orders with the company for all the cylinder forgings for all the Liberty engines made in America. Over 400,000 had been delivered.
A large volume of experimental work was done in building 3-ton military tanks, and the government had just placed order for 15,000 of the small, two-man, military tanks, and 3000 of the 6-ton military tanks. Cancellation came before more than a dozen or so had been delivered. But the foundations had been laid and the superstructure almost completed for an enormous building in which tanks alone were intended to be built.
Motion picture reels in behalf of Liberty loans, Red Cross and Patriotic fund work were made by the company and supplied to the government in sufficient quantities to serve the entire United States in motion pictures. Motion picture reels in volume sufficient to serve the armies of the States in France, Italy and Palestine were furnished by the Motion Picture Department of the Ford Motor Co.
The company also did more than \$1,000,000 of work in the production of special devices in the naval department of the British government.
It also furnished the government with 275 skilled mechanics for work in France.
The Ford company, through its chemical laboratory, co-operated with the manufacturers of gas masks for the United States army.
An average of 34,000 men and women were employed by the main factory at Highland Park; 8800 men at the shipbuilding plant on the River Rouge, 4000 men employed at the new blast furnace, in course of construction on the River Rouge, 250 men employed at the carburetor plant, or an average of 45,000 employees, practically all on 100 per cent government work, under a standard 8 hr. day and a minimum wage of \$5 a day.

New Tractor Company

EVANSVILLE, IND., May 12—A new company, capitalized at \$1,000,000, has been formed for the manufacture of farm tractors. Robert C. C. and J. B. Graham, of Graham Bros., Inc., glass manufacturers, and Benjamin Bosse, president of the Bosse-World Furniture Co., are interested in the new concern. Besides a local plant it is planned to have a branch at Loogootee.

Eugene McGuckin in New Offices

PHILADELPHIA, May 10—The Eugene McGuckin Co. has moved its offices from 105 North 13th Street to 1211 Chestnut Street.

**Current News of
Factories****Notes of New Plants—
Old Ones Enlarged****Climber Cars in Production**

LITTLE ROCK, ARK., May 12—The Climber Motor Corp. has just completed its new plant here. Machinery is being installed and operations will start immediately. It is a 1-story building of concrete, steel and glass, 100 x 300 ft. Other units will be built later. The Climber Co. will manufacture a passenger car, truck and tractor. The truck and tractor departments will not be established until passenger car production is well under way.

George Schoeneck is chief engineer. He has been in charge of a small shop in Detroit where the first Climber experimental cars were made. H. F. Buhler is sales manager of the company. The plant will start work with a force of 100 men. It is proposed to produce 10 cars daily during the first year.

New Vim Tractor Co.

SCHLEISINGERVILLE, WIS., May 10—The Vim Tractor Co. has been organized to take over the plant and equipment of the Standard Machinery Co., manufacturer of gas and kerosene engines, which recently has developed a tractor design to be placed in quantity production by the new corporation. The Standard works are being re-tooled and will be ready to begin manufacturing tractors at once. Officers of the Vim company are: President, Charles D. Storck; vice-president, John F. Mayer; secretary, Dr. Philip M. Kauth; treasurer, Peter Schuck; works manager, Otto E. Zahn.

Samson Tractor Buildings Under Way

JANESVILLE, WIS., May 10—Contracts were awarded Thursday by the Samson Tractor Co., subsidiary of General Motors Corp., for the construction of the second unit of the new tractor plant here, where a total investment of \$4,500,000 is contemplated. The first unit, 200 x 500 ft., was finished late in March. The second building will be an exact duplicate of the original unit. When it is completed, the assembling of Samson tractors will be done by the "endless chain" method. A third unit will probably be erected in August or September.

**Oldberg Adds to Manufacturing
Facilities**

DETROIT, May 8—The Oldberg Mfg. Co., makers of automobile and marine mufflers, will greatly increase its manufacturing facilities through the purchase of a 3-story brick factory building on East Grand Boulevard, formerly occupied by the O'Neill Mfg. Co.

Boring Tractors on Market Soon

ROCKFORD, ILL., May 10—The Boring tractor is getting into production and will be on the market by June 1. The Boring Tractor Corp. has built a new fire-proof factory at Blackhawk Park Avenue and Kishwaukee Street, which will be occupied during the present week. It is a stone building, 70 x 200 ft., monitor construction, and will have a capacity of about 300 tractors a year.

The Boring tractor is a 2-wheel tractor of 2-plow capacity. It has a new and simple power lift for the plows and enclosed chain drive.

K-W Wins Switch Litigation

NEW YORK, May 13—The K-W Ignition Co., Cleveland, has won its suit against the Goodrich-Lenhardt Co. for infringement of certain patents on ignition locks. The United States District Court for the Eastern District of Pennsylvania has held that patents Nos. 841,844 (Burret), 1,015,300 (Cox) and 1,253,470 (Cox), under which the K-W Ignition lock switches are made are valid and infringed by lock switches made by the Goodrich-Lenhardt Co. The latter company has paid certain damages to the K-W company and is allowed to dispose of a comparatively small quantity of lock switches which it now has on hand.

**National Engineering Company Enlarging
Force**

SAGINAW, May 12—The National Engineering Co., acquired some time ago by the General Motors Corp., is employing about 200 men, but it is said the force will be doubled in a short time. The company makes the engine crankshaft for the Oakland Motor Car Co.

Allith-Prouty Adds Hubs to Line

DANVILLE, ILL., May 13—The Allith-Prouty Co., engaged in the manufacture of steel and iron products, has installed new machinery and will turn out hubs and other parts for motor vehicles. Thirty additional machinists will be required to take care of the new line. The new machinery will have a capacity of 50,000 automobile hubs per month to start. The war contracts have all been filled and the plant will hereafter handle the regular line of business.

Perfex Creditors Meet

RACINE, WIS., May 14—At the first meeting of creditors of the Perfex Radiator Co., Julius J. Goetz of Milwaukee, previously appointed receiver, was elected trustee under bond of \$50,000. A court order was filed authorizing the trustee to continue and operate the business for 30 days. The Perfex plant has been in operation since bankruptcy proceedings were filed March 28. It is believed that creditors will succeed in effecting a reorganization and that they will realize practically 100 per cent on their claims. The next meeting of creditors will be held Monday, June 2, in the federal court at Milwaukee.

Flanders Retiring from Management of Maxwell

DETROIT, May 12—Walter E. Flanders, chairman of the board of directors of the Maxwell Motor Co., Inc., has advised the Maxwell company that he will not again contract with them July 31, but will retire from the management of their affairs. He will probably retain an interest in the Maxwell company, but will cease active work. Mr. Flanders will not state just what his future plans are. It is understood, however, that shortly after finishing his duties at the Maxwell plant he will board his new yacht for a long cruise down the Atlantic coast through the Panama Canal for California.

Mr. Flanders, it is said, has disposed of a large part of his property holdings in Michigan and Ohio. It has been said that he contemplates locating in California, where he will establish a factory to make a new automobile. That he will go into the automobile manufacturing business in California, Mr. Flanders denies.

E. W. Templin, formerly assistant engineer of the Selden Motor Truck Co., and more recently production manager of the Bessemer Motor Truck Co., has joined the staff of the Goodyear Tire & Rubber Co. as motor truck engineer attached to the development department.

Raymond F. Brown has been appointed purchasing agent of the Bantam Ball Bearing Co., Bantam, Conn., to succeed C. D. Stoddard, who resigned.

Ernest P. Johnson, who has been with the Franklin Automobile Co. since 1915, succeeds Walter C. Biddle as assistant sales manager. Mr. Biddle resigned to handle Franklin distribution in Toledo.

Sherman W. Dorman who for the past three years has handled the buying of accessories for the Biddle Purchasing Co. for domestic and foreign trade, is now connected with the Overseas Motor Service Corp. as manager. The corp. will handle a number of accessories in foreign fields exclusively, those controlled by the United Motors Co. being prominent.

Lynn V. Blankman has been appointed manager of the central west territory for the United Aircraft Engineering Corp., New York. His headquarters are at 514 Westminster Building, Monroe and Dearborn streets, Chicago.

Connecticut Telephone & Electric Adds to Engineering Staff

MERIDEN, CONN., May 9—F. J. Croton, Jr., and John A. Terrell, both recently released from government service, have been added to the engineering staff of the Connecticut Telephone & Electric Co., Croton as mechanical engineer and Terrell as assistant to the chief radio research engineer. Mr. Croton, before enlisting in the Chemical Warfare branch of the army, was in charge of a die house of the J. A. Barbour Co.

Men of the Industry Changes in Personnel and Position

Squires Engineering Co. Formed

DETROIT, May 9—John Squires, formerly chief engineer of the Signal Motor Truck Co., has organized the Squires Engineering Co. and has opened a laboratory here. Mr. Squires is working on a steam power plant for distillate fuel. He hopes to have it in operation in an experimental car by early fall.

Fred I. Tone, former vice-president and chief engineer of the American Motors Co., Indianapolis, and later chief engineer of the United States Ball Bearing Co., is now with C. Harold Wills, former chief of the Ford Motor Co., who is making ready to enter the car manufacturing field in Detroit.

P. C. Gunion is now assistant manager of the new Industrial Division of the General Motors Corp.

Peter T. Hill has joined the sales department of the Torbensen Axle Co.

Guy Wright, formerly assistant sales manager of the Buda Motor Co., Harvey, Ill., has been made sales manager, succeeding Lon Smith, who resigned to become sales manager of the Midwest Engineering Co., Indianapolis.

H. A. Flogaus has been appointed to the engineering staff of the Maibohm Motors Co., Sandusky, Ohio. Previously he was with the Willys-Overland Co., Toledo, and later with the Curtiss Aeroplane & Motor Corp., Buffalo. Last year he was stationed at Washington as assistant chief draftsman of the Motor Transport Corps, in charge of the chassis design of Class B trucks. Since leaving government service he has been chief tool engineer with the Matthews Engineering Co., Sandusky.

Trailer Manufacturers Assn. Office

NEW YORK, May 12—The Trailer Manufacturers Association of America, recently organized to deal with questions of importance to the trailer industry, has opened offices at 110 West 40th Street. Legislation affecting trucks and trailers is one of the most important matters that will be handled by the association. The question of exemption of trailers from taxation under the Revenue Act of 1918 has also been taken up. A publicity campaign to familiarize the public with the advantages of haulage with the use of trailers and the development of transportation by highway will be part of the association program.

White Resigns as Cadillac Vice-President

DETROIT, May 12—D. McCall White, vice-president and assistant general manager of the Cadillac Motor Car Co., whose resignation is to take effect at once, will not discuss his future plans further than to say that he will remain in the automotive business and that his operations will be very extensive.

Mr. White upon coming to America, from England, became a member of the engineering department of the Cadillac company, later being appointed chief engineer. He started with that company in a secret office in the heart of Detroit in March, 1914, and commenced the design of the 8-cylinder Cadillac engine, which he completed in less than 2 months. He then went East, changed his name, calling himself David Wilson, and had the parts for 3 cars completely machined all ready for assembly, returning to Detroit on June 4, exactly 117 days after the first pencil lines were drawn on the designing board. The car proved successful on test and the tooling up was immediately commenced, with the result that the Cadillac Motor Car Co. announced to the public on September 25, 1914, that it would build an 8-cylinder car, delivering the first 40 cars by the middle of October. After getting into full production, the company completed 13,000 by the middle of June, 1915.

Shortly after the United States entered the war, Mr. White was appointed a member of the committee which was charged with the placing of the Liberty engine on a production basis.

Walter T. Roose, formerly in the purchasing department of the Studebaker Corp., has become sales representative for the Motor Materials Co., Detroit.

Russell Munro has returned from France and has resumed his duties as assistant advertising manager of the Ford Motor Co., Detroit.

James G. Roe has resigned as advertising manager of the J. C. Wilson Truck Co., Detroit, and has joined the Green-Fulton-Cunningham Co., advertising agents.

A. E. Crysler has joined the Commerce Motor Car Co., Detroit, as assistant to the director of sales and advertising, G. D. Wilcox.

New Directors for Allis-Chalmers

WILMINGTON, DEL., May 10—The Allis-Chalmers Co. at its annual stockholders' meeting elected the following directors for the ensuing year: J. H. McClement, chairman; Otto H. Folk, Oliver C. Fuller, J. D. Mortimer, Fred Vogel, Jr., Charles F. Pfister, Knox Pim, F. O. Wetmore, Arthur W. Butler, Arthur Coppel, Charles W. Cox, Oscar L. Cubelman, I. C. Hutchins, Jr., William T. Abbott, James P. Winchester, Dr. C. E. Albright and Charles Hayden.

Counteracting the Propaganda of the Irreconcilables*(Continued from page 1072)*

undertaken within the factory for the benefit of the worker, they have been confined, almost without exception, to training in the conditions of work and not in the necessities of business as such or in any other way that would broaden their outlook upon the character of industrial organization. Under such circumstances the propaganda from which we quoted in the beginning of this article is particularly plausible and not without its allurements to the worker who gets his information about capital from the more sensational newspapers and from the similarly informed workers with whom he spends his social hours.

Under such circumstances the most carefully developed plans for co-operation with the workers, the most efficient means for allowing them a voice in the government of their working conditions and the keenest suggestions and development for their comfort and safety are of little value unless they are promoted with such care and developed with such patience that the discouragements which must be faced are none of them sufficient to alter the determined policy.

It is obvious that the workers have learned the strike method of enforcing demands very thoroughly; so thoroughly that they are apt to give it an importance and a power which it does not possess in fact; that they are suspicious of everything which is proposed by the manufacturer; that they have learned to regard capital and the present capitalist system, so called, as a direct bar to their enjoyment of greater benefits, and that the only means of education which ordinarily come into their life are newspapers with their inevitable inaccuracy and partisanship and who are generally emphasizing and confirming this opinion. In addition to all this they are subject to the ceaseless propaganda of the radical elements in the labor bodies who are committed to the destruction of the present system and who are constantly pushing their point of view, not without intelligence and not without a keen political understanding of the people upon whom they are working.

All these things must be taken into account by the manufacturer, and particularly should they be studied with an eye to their importance in their relations to the educational processes, to the character and understanding of the supervisors and to the promotion which must be undertaken if any understanding of industrial organization and its necessities is to permeate the minds of the workers in any reasonable time.

The matter is proving to be a sufficiently difficult one in Great Britain, where the foreign element is small and all the people have grown up with the same political traditions and the same racial background. It is much more complicated in this country, where it is not unusual to have from six to twenty separate races among the workers in a single manufacturing plant; with politi-

cal histories ranging from feudal autocracy to trivial communism, with little or no knowledge of the political and racial conceptions which govern this country and with less understanding of the significance of their surroundings.

It is inevitable that plans which appear to the manufacturer to be of great benefit to the workers should be accepted by the workers without enthusiasm or rejected by them or should fail to bring industrial peace within the organization because of the inherent difficulty in securing a common idea and developing a common purpose where the ideas are already so far apart. Nevertheless the old Scotchman's statement is still correct, that it is up to the manufacturer to find out what his workmen think and to understand them a great deal better than they can be expected to understand him.

Chicago-Cleveland Air Mail

WASHINGTON, May 13—The air mail service will inaugurate a route between Chicago and Cleveland beginning May 15. The service will advance delivery of letters at Cleveland and Boston by 16 hours, and at Albany, New York City and Springfield, Mass., by 6 hours.

Mail from San Francisco and the entire Pacific Coast states put on Burlington train No. 8; mail from South Dakota and Northern Illinois put on Illinois Central No. 12; mail from Northern Minnesota and Northern Wisconsin put on Northwestern train No. 514; mail from Minnesota, North Dakota and Montana put on C. M. & St. P. train No. 18, and mail from Kansas City and the entire Southwest put on Santa Fe train No. 10 will reach Chicago in time to make connection with the air mail east bound. The mail from these trains will be taken direct to the air mail field. At Cleveland the air mail will catch the New York Central train at 4 p. m. for the East.

Under this arrangement the air mail will be delivered in Cleveland and Boston on afternoon deliveries instead of the following morning. At Albany, New York City and Springfield, Mass., this mail will catch the morning delivery.

Letters mailed in New York City in time for New York Central train No. 19, leaving at 5.31 p. m., will reach Chicago in time for 3 o'clock afternoon delivery by carrier instead of the following morning carrier delivery as would be the case if sent by train.

Airplane stamps or ordinary postage at the rate of 6 cents per ounce must be used on mail, and the letters conspicuously marked "AIR MAIL." A special delivery stamp in addition to the air mail postage will insure still greater expedition of letters at points of delivery.

Haynes Enlarging Plant

KOKOMO, IND., May 14—A \$450,000 addition to the Haynes automobile plant to be built here will include an assembling plant and forge shops, and will be the beginning of \$1,500,000 worth of construction which the Haynes company will put up.

Curtiss K-6 and K-12 Aircraft Engine
(Continued from page 1054)

oil temperature regulator. This consists of a coil, having a cored water passage and two cored oil passages. Water of the cooling system circulates through this temperature regulator while on its way from the radiator to the pump. This temperature regulator is not merely an oil cooler, but also serves to heat up the lubricating oil quickly when first starting the engine from cold. In first starting an engine, the jackets heat up much quicker than the lubricating oil, as the latter circulates only very slowly. By passing the cooling water through the duct of the oil temperature regulator, the oil can be brought up to normal working temperature much quicker than would otherwise be possible.

In regular operation, the oil tends to assume a much higher temperature than that of the cooling water, and then the temperature regulator acts as an oil cooler. It keeps the temperature of the oil down and maintains its lubricating properties. After passing through the ducts in the regulator, the oil passes through the triple return pump and then to the oil chamber, whence it is recirculated. There is an oil gage on the oil pan, which is calibrated to show the amount of oil in the sump in gallons. There is an oil filler on the top of the crankcase. The oil pressure relief valve is adjustable, so that the pressure under which oil is fed to the bearings can be varied to suit condition of work.

Cooling water is circulated by a centrifugal pump mounted on a vertical shaft at the forward end of the engine. The pump used on the K-12 is of the double type, having two outlets on opposite sides, one connecting to each cylinder block. The water, as it comes from the radiator, passes first through the oil temperature regulator, and then enters the pump through the pump cover casting. From the pump the water is delivered into the cylinder jackets at the lowest part of it. From the cylinder jackets the water passes into the head jacket through a series of drilled holes. There the water circulates around the valve passages and then leaves the head casting at a point between the valves on each cylinder. Next it passes through the inlet manifold jacket, and thence it returns to the radiator.

The reduction gears, which are of the herringbone type, with 5-7 pitch, give a reduction in the ratio of 5 to 3. The gears are bolted to flanges with alloy steel bolts. Each half of the herringbone gears has a width of face of 1 in. The gears are first roughed out and then heat-treated, after which the centers and faces are ground, and the gears are then recut.

Sewell Cushion Wheel Dividend

Sewell Cushion Wheel Co., Detroit, 7 per cent dividend declared on preferred and common, for stockholders of record June 1. Within 60 days factory branches will be opened in Portland, Ore., Los Angeles and San Francisco.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:

Muriatic, lb. ....	.02 - .03
Phosphoric (85%) lb. ....	.35 - .39
Sulphuric (60%), lb. ....	.008

Aluminum:

Ingot, lb. ....	.33
Sheets (18 gage or more), lb. ....	.42
Antimony, lb. ....	.07 - .07½

Burlap:

8 oz., yd. ....	.08½ - .09
10½ oz., yd. ....	.10½ - .11

Copper:

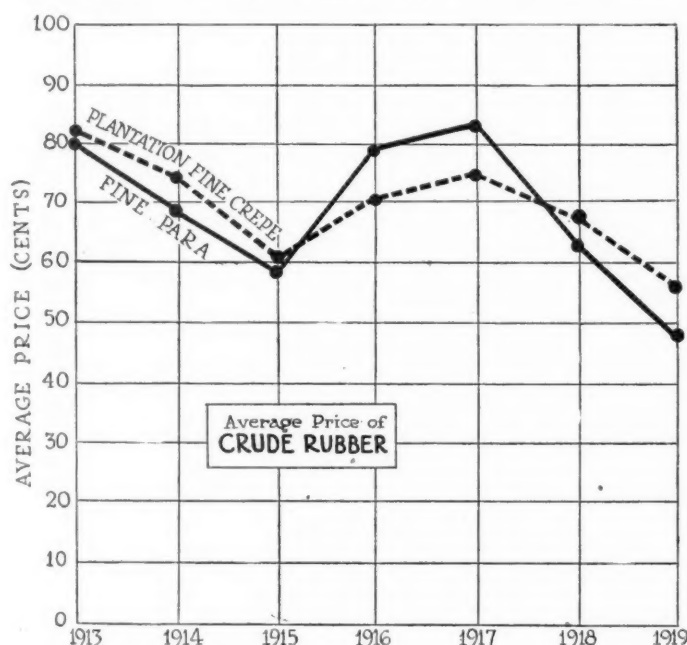
Elec., lb. ....	.15½ - .15¾
Lake, lb. ....	.15¾ - .15¾

Fabric, Tire (17¼ oz.):

Sea Is., combed, sq. yd.	1.40
Egypt, combed, sq. yd.	1.25
Egypt, carded, sq. yd.	1.20
Peelers, combed, sq. yd.	1.08
Peelers, carded, sq. yd.	.85

Fibre (½ in. sheet

base), lb.50
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Prices of crude rubber, both plantation and wild, were affected during war time both by Government restrictions and lack of available shipping. The chart shows average price on May 1 in each year

Graphite:

Ceylon, lb. ....	.09 - .22
Madagascar, lb. ....	.10 - .15
Mexico, lb. ....	.03½

Lead, lb.04½ - .05

Leather:

Hides, lb. ....	.24 - .45
Nickel, lb. ....	.40

Oil:

Petroleum (crude):	
Kansas, bbl.	2.25
Pennsy., bbl.	4.00
Gasoline:	
Auto, gal.	24½
68 to 70 gal.	30½
Lard:	
Prime City, gal.	2.60 - 2.65
Ex. No. 1, gal.	1.00 - 1.20
Linseed, gal.	1.56
Menhaden (dark), gal. ....	.75 - .80

Rubber:

Plantation:	
First latex pale crepe, lb. ....	.48

Brown crepe, thin, clear, lb. ....	.41½ - .42
Smoked, ribbed sheets, lb. ....	.47

Para:

Up River, fine, lb. ....	.56½
Up River, coarse, lb. ....	.34½ - .34¾
Island, fine, lb. ....	.47 - .47½
Shellac (orange), lb. ....	.62 - .68
Spelter, lb. ....	.06 - .06½

Steel:

Angle beams and channels, lb. ....	.02½ - .03
Automobile sheet (see sp. table).	
Cold rolled, lb. ....	.04½ - .04¾
Hot rolled, lb. ....	.03½ - .03¾
Tin ....	.72½
Waste (cotton), lb. ....	.12¾ - .17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when Seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.	\$5.95	\$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping.	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock.	6.05	5.95
Crown fender, cowl and radiator cas- ing, extra deep stamping.	6.55	6.45
Crown fender cowl and radiator cas- ing, deep stamping.	6.30	6.20
Automobile Sheet Extras for Extreme Widths:		
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lbs.		
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lbs.		
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lbs.		
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lbs.		
Blank Sheet Extras to Apply to Narrow Widths:		
Oiling, 10c. per 100 lb.		
Patent leveling, 25c. per 100 lb.		
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.		
Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.		

Automotive Securities on the Chicago Exchange at Close May 10

	Bid	Asked	Net Ch'ge
Auto Body Company.	9	10	..
Briscoe Motor Car com.	14	..	..
Briscoe Motor Car pfd.	50	65	..
*Chandler Motor Car.	149	151	+5
Chevrolet Motor Car.	209	211	..
Cole Motor Car Co.	120	125	+27
*Continental Motors com.	9	9½	+¼
Continental Motors pfd.	96	99	..
Edmunds & Jones com.	29	31	+10
Edmunds & Jones pfd.	75	80	+3
Electric Storage Bat.	76	78	+1
Federal Motor Truck.	42	44	+8
Fisher Body Co. com.	57	59	-½
Fisher Body Co. pfd.	92	94	..
Ford Motor of Canada.	320	330	..
General Motors com.	188½	189½	+6¾
General Motors pfd.	91¾	93¾	+2¼
Hupp Motor Car com.	8¾	9¼	+½
Hupp Motor Car pfd.	98	101	..
Kelsey Wheel Co. com.	35	37	..
Kelsey Wheel Co. pfd.	93	95	..
Manhattan Electric S com.	41½	42½	+¾
Maxwell Motor com.	68½	69½	..
Maxwell Motor 1st pfd.	32½	33½	+1¼
Maxwell Motor 2nd pfd.	40½	42	+6½
McCord Mfg. com.	100	102	+3
McCord Mfg. pfd.	45	47	+7

	Bid	Asked	Net Ch'ge
Motor Products Corp.	45	50	+10
Nash Motors Co. com.	230	..	..
Nash Motors Co. pfd.	95	100	..
National Motor Co.	16	20	..
Packard Motor Car com.	170	177	+24
Packard Motor Car pfd.	100	102	+1
Paige-Detroit Motor com.	38½	39¼	+4
Paige-Detroit Motor pfd.	9	9¾	..
Peerless Motor Truck.	29	31	+3
*Pierce-Arrow M. Car com.	49¾	50¾	-2
Pierce-Arrow M. Car pfd.	102	104	..
Premier Motor Corp. com.	5	..	..
Premier Motor Corp. pfd. ....	..	75	..
Prudden Wheel Company.	21	22	..
Reo Motor Car Co.	31	32	+4¼
*Republic M. Truck com.	48	50	+5
Republic M. Truck pfd.	91	95	..
Saxon Motor Car com.	6¾	8¾	+¼
Scripps-Booth Corp.	25	30	+4
Stewart Warner S. Corp.	90½	92½	..
Stromberg Carburetor Co.	38	40	..
Studebaker Corp. com.	77¾	78¾	+¾
Studebaker Corp. pfd.	94	97	..
Stutz Motor Car Co.	57¾	58¾	+¼
United Motors Corp.	47	49	..
White Motor Co.	57½	58½	-5
Willys-Overland com.	33¼	34¼	-¾
Willys-Overland pfd.	92	93	..

RUBBER STOCKS

	Bid	Asked	Net Ch'ge
Ajax Rubber Co.	88	90	-4½
Firestone T. & R. com.	153	156	+11
Firestone T. & R. pfd.	100	101	..
Fisk Rubber Co. com.	149	152	+14
Fisk Rubber 1st pfd.	100	105	..
Fisk Rubber 2nd pfd.	149	152	+11
Fisk Rubber 1st pfd conv.	105	110	..
*Goodrich, B. F. com.	70	71	-3¼
Goodrich, B. F. pfd.	107	109	..
Goodyear T. & R. com.	323	330	+39
Goodyear T. & R. 1st pfd.	106	108	+½
*Goodyear T. & R. 2d pfd.	107	108	+1
*Kelly-Springfield com.	124½	125½	-2¾
Kelly-Springfield 1 pfd.	95	97	..
Lee Tire & Rubber Co.	33¾	34¾	-3¼
Marathon Tire & Rubber	55	75	..
Miller Rubber Co. com.	185	..	+13
Miller Rubber Co. pfd.	105	107	+1
Rubber Products Co.	129	132	+2
Portage Rubber Co. com.	155	159	..
Swinehart T. & R. Co.	78	81	..
U. S. Rubber Co. com.	94¾	95¾	-3½
*U. S. Rubber Co. pfd.	112½	113½	+½

*Ex. Dividend.

Calendar

SHOWS

- May 10-17—Bristol, Va.-Tenn. Cars, Trucks, Tractors, Airplanes and Accessories. Bristol Chamber of Commerce. C. W. Roberts, Manager.
- May 15-June 1—Venezuela. National Exhibit of Venezuela.
- June 2-6—Hot Springs, Va. Convention Automobile Equipment Assn., Homestead Hotel.
- *Oct. 15—Paris. Grand Palais, International Automobile Mfrs. Congress.
- Nov. 7-15—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
- December—Brussels. International Automobile Mfrs. Congress.
- January—New York. International Automobile Mfrs. Congress.
- February—Chicago. International Automobile Mfrs. Congress.
- Feb. 23-Mar. 6—Birmingham, Eng. British Industries Fair.

TRACTOR SHOWS

- May 30—College Park, Md.—Power cultivator Demonstration, Maryland State Dept. of Agriculture.
- June 8-14—Denver, Col. Sectional Tractor Demonstrations, Denver Tractor Club.
- July 14—Wichita, Kan. Automotive Committee of National Implement Assn.
- Aug. 18-22—Aberdeen, S. D. Sectional Tractor Demonstrations.
- October—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.

CONTESTS

- †May 17—Uniontown, Pa., probably 112½ miles.
- May 30—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
- May 30-31—Richmond Va.—2-Day Dirt Track Meet Virginia State Fair Grounds Track.
- †May 30-31—Los Angeles, Cal.—Los Angeles-Yosemite 3rd annual gasoline economy run.

- †May 31—Indianapolis, Indianapolis Motor Speedway Assn., 500 miles.
- *June 14—Sheepshead Bay, L. I. Speedway race.
- July 4—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
- *July 5—Cincinnati, O., Speedway.
- *July 19—Uniontown, Pa. Speedway race.
- *July 26—Sheepshead Bay, L. I. Speedway race.
- *Aug. 15—Middletown, N. Y. Dirt track event.
- *Aug. 22-23—Elgin, Ill. Road race.
- *Aug. 23—Sheepshead Bay, L. I. Speedway race.
- *Sept. 1—Uniontown, Pa. Speedway race.
- *Sept. 20—Sheepshead Bay, L. I. Speedway race.
- *Sept. 27—Allentown, Pa. Dirt track event.
- *Oct. 1—Cincinnati, O. Speedway race.

†Sanctioned.

*Tentative dates.

- *Oct. 4—Trenton, N. J. Dirt track event.
- *Oct. 11—Danbury, Conn. Dirt track event.

CONVENTIONS

- May 1-June 1—Atlantic City, N. J.—Pan-American Aeronautic Convention and Exhibition—Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation.
- May 21-24—Washington—Conference on Weights and Measures—Bureau of Standards.
- June 2—Chicago, Ill.—Natl. Gas Engine Assn. Hotel Sherman.
- June 3-6—Washington, Pan-American Commercial Conference, Pan-American Building.
- June 23-28—Ottawa Beach, Mich.—S. A. E. Mid-summer Meeting.
- Sept. 22-24—Philadelphia. Annual Convention National Association of Purchasing Agents, Bellevue-Stratford.

Swiss Market for Motor Cars

WASHINGTON, May 11—Consul Lewis W. Haskell reports that Switzerland will have to look to the United States for motor cars and trucks, lubricants and gasoline. Previous to the war \$125,000,000 worth of goods annually were bought from Germany, and American manufacturers will undoubtedly have a future market in Switzerland if terms, prices, etc., are made attractive to the Swiss buyer.

Tractors in British Guiana

WASHINGTON, May 12—There are 50 tractors in use in British Guiana, according to a consular report, chiefly in the rice and sugar industries. It is expected that the number will be increased within the next few years. The soft soil during the wet season makes the crawler type of tractor popular.

Cars in Venezuela

WASHINGTON, May 12—There are 300 automobiles in the Puerto Cabello district of Venezuela, chiefly 5-passenger cars of American manufacture, retailing at 52 to 100 per cent higher than in the United States, according to a consular report. The scarcity of skilled mechanics, high price of gasoline, poor roads and the cheap cost and care of pack animals restrict the sale of automobiles.

Market for Tractors in Guadeloupe

WASHINGTON, May 11—Despite the fact that practically all of the 75,000 acres devoted to sugar cane in Guadeloupe could be plowed and cultivated by tractors, there are at present not more than 7 tractors in use there, according to report of Consul Henry T. Wilcox. All of the tractors were brought from the United States. Satisfactory results are

apparently obtained from both light and heavy tractors.

Grande Terre and Marie Galante, the islands on which most of the cane is grown, are almost level, and the portions now under cultivation are divided into about 1100 estates, which vary greatly in size. The soil is heavy and in many places marshy. The greatest drawback to the use of tractors in Guadeloupe is the lack of experienced operators. The ordinary laborers cannot drive such machines. Other obstacles are the numerous ditches which are found in the fields, the high cost of fuel, and the lack of initiative on the part of the planters.

The duties charged on tractors when imported from countries other than France are \$1.31 per 100 lb. net, plus 3 per cent ad valorem. Such machines of French manufacture pay only the local duty of 3 per cent.

Truck Market in Scandinavia

WASHINGTON, May 12—There is a great demand throughout Scandinavia for American motor truck chassis, 3- to 5-ton, for immediate delivery, to cost about \$3,000, according to the Department of Commerce, which recommends that American dealers make a personal canvass with demonstrations.

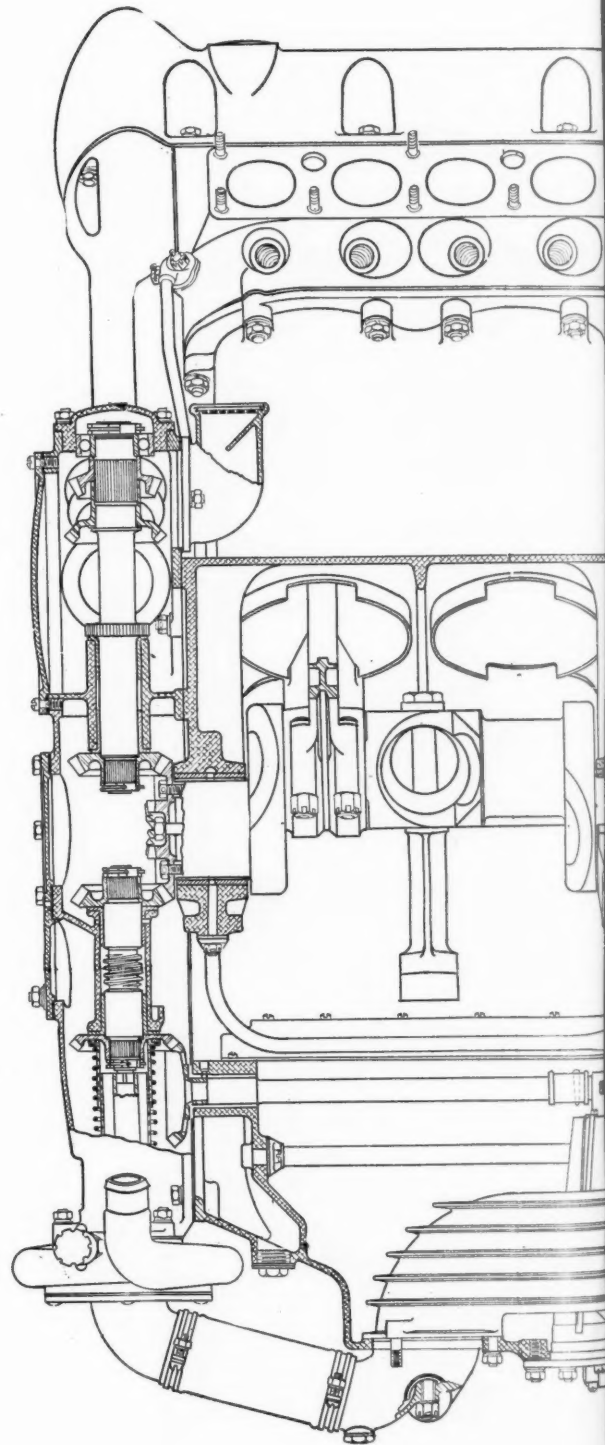
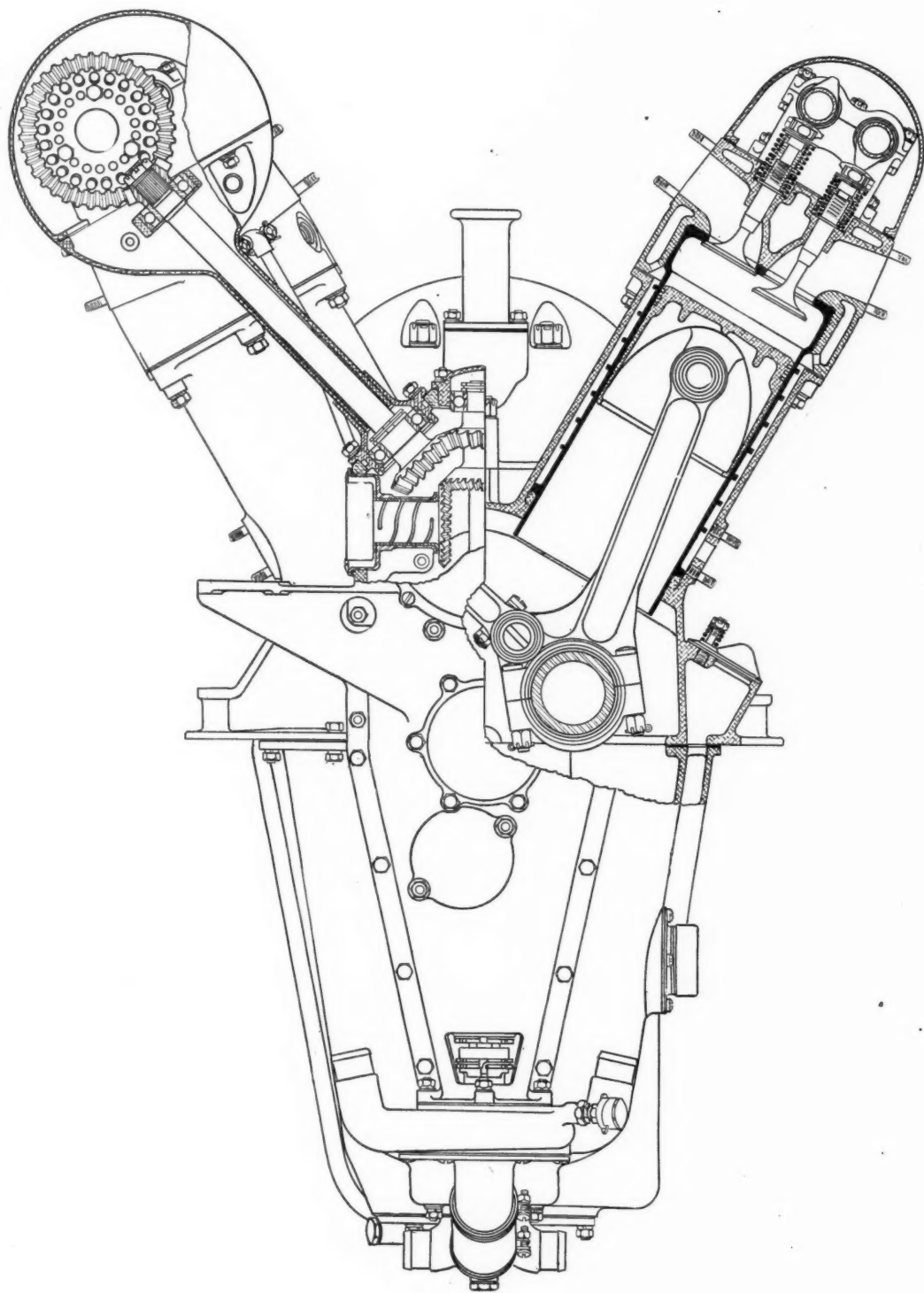
War Dept. Places Orders for Parts

WASHINGTON, May 12—Orders for motor vehicles and parts are still being placed by the War Department. The Locomobile Co., Bridgeport, Conn., received an order totaling \$232,465.19 for spare parts for the Class B truck; Hendee Mfg. Co., Springfield, Mass., spare parts for motorcycles, \$181,258.38; Harley-Davidson Motor Co., Milwaukee, spare parts for motorcycles, \$132,301.25; Continental Motors Corp., spare parts for AA ambulances, \$29,138.42.

Mexican Firm Issues Shipping Instructions

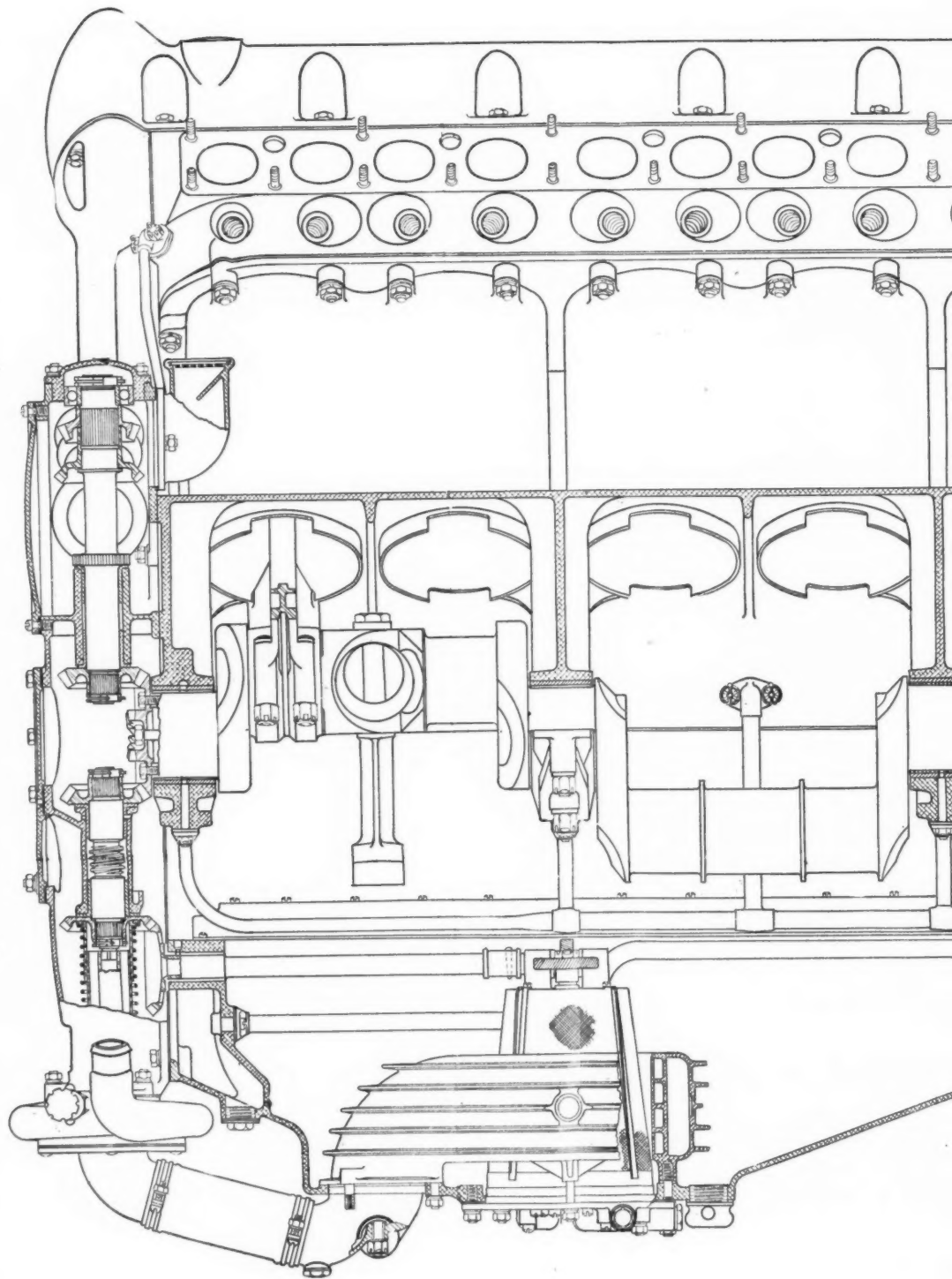
WASHINGTON, May 12—In order to facilitate imports into Mexico of automobiles from the United States, a concern in Mexico City has furnished complete shipping instructions to its American connections. Following are the complete directions:

1. **Packing.**—Pack goods securely for water transportation. Iron strapping is cheaper and more effective than heavy boxing.
2. **Marks and Numbers.**—Mark packages with brush or stencil, also with gross and legal weight on each. Show these marks and numbers on every document relating to the shipment. Number packages consecutively. Do not place any other marks or numbers whatever on the packages.
3. **Invoices and Packing Lists.**—Make five invoices and four packing lists. Send original and two copies of invoice and original and one copy of packing list to us. Send two copies of each to — (name of forwarding agent in New York). Show contents of each package and itemized prices on each invoice. Show gross and legal weight of each package on packing lists; also the marks and numbers as they actually appear on the packages. If a package contains more than one class of goods give legal and net weights of each kind.
4. **Weights.**—Gross weight is the weight of the package and contents. Legal weight is the weight of the goods, together with the interior packing or containers, such as cardboard or tin boxes or bottles, but does not include the weight of the outside box.
5. **Cubic Measurements.**—Show on invoices and packing lists the measurement of each package.
6. **Local Truck Deliveries.**—New York shippers will send two copies of invoices and two copies of packing lists to — (New York forwarding agents), who will give instructions for delivery to steamer.
7. **Inland Shipments.**—Shippers outside of New York will ship on local bill of lading to (New York forwarding agent), mark bills of lading "For export," and send same to — (New York forwarding agent) with two copies of invoices and two copies of packing lists immediately shipment is made.
8. **Express shipments.**—When shipment is requested to be forwarded by express shippers will send express receipts to New York forwarding agents with two copies of invoices and two copies of packing lists immediately shipment is made.
9. **Insurance, Consular Invoice, and Ocean Bill of Lading.**—These will be attended to by our forwarders on receipt from you of the above-mentioned documents.



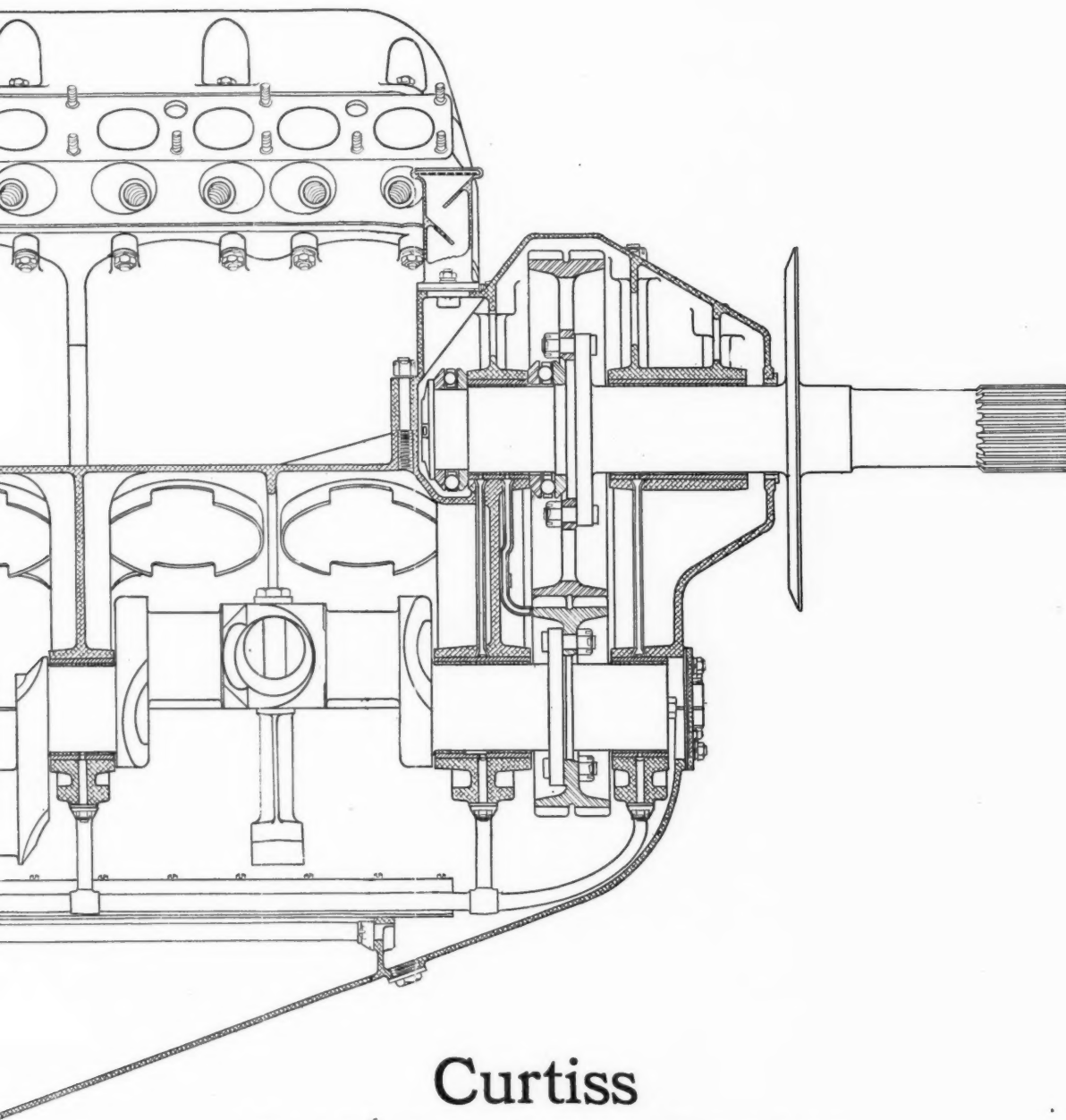
This 12-cyl. 4½ x 6 in. engine is one of the lightest per horsepower ever built. Its special features include steel liners inserted into cast aluminum cylinder blocks, double camshafts, parallel sliding cam followers,

*articulated
regular
down*



in. engine is one of the lightest per horsepower ever
atures include steel liners inserted into cast alum-
a, double camshafts, parallel sliding cam followers,

articulated connecting rods, a balanced crank-
regulating device and a herringbone reduction g-
down in the ratio of 5:3. All these features are



Curtiss K-12 Aircraft Engine

ed crankshaft, an oil temperature
duction gear. The speed is geared
atures are clearly shown in the cut